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EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

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IMPLEMENTATION OF PARTY CONGRESS DECISIONS REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 3-24

[Article by Academician A. G. Aganbegyan: "Breakthrough and Acceleration"]

[Text] Contemporaries cannot always easily estimate the scope of events in which they are participants and witnesses. As they say, one can see more at a distance.

There is hardly anyone who will doubt the special significance of the 27th Party Congress. I was fortunate enough to be present from the beginning to the end, to experience the unusual creative situation and the atmosphere of candor and openness, criticism and self-criticism, and the main thing--the force of constructive ideas and the direction toward the future.

Just as the highest of the peaks in a mountain chain singles itself out, so one can see the 27th Congress in the series of party forums of our day. The congress was given special significance by the fact that it convened at a turning point in the history both of all mankind and of our country. The historic uniqueness of the moment we are experiencing may not be completely clear yet. But it was revealed with all completeness and convincingness in the political report from the CPSU Central Committee to the 27th Party Congress which was presented by Comrade M. S. Gorbachev. Taking into account the qualitatively new situation within the country and in the world arena, the congress established a deeply substantiated political course, an important part of which is the party's new economic strategy.

The party's strategic line is embodied first and foremost in the new edition of the CPSU Program which was adopted by the congress. The development of the organizational principles of party life was reinforced in the CPSU Charter which was also unanimously approved by delegates to the congress.

The basic conclusions and suggestions of the political report were extensively formulated in the resolution of the congress.

Another event of exceptional importance is the document adopted by the congress, the Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000.

Now the party and the people are armed with clear directions and a program of action. The time has come for great accomplishments, a time of turning ideas into concrete deeds.

Increasing the Rate of the Country's Socioeconomic Development

The strategy of the communist party is the concept of accelerating the country's socioeconomic development that was adopted by the congress. This concept is multifaceted, it has quantitative and qualitative aspects, and it embraces all spheres and units of our society, above all the economy as the main field on which the historic battle for comprehensive and planned improvement of socialism and a gradual changeover to communism is developing. On the quantitative plane acceleration means a breakthrough in the dynamics and increased growth rates of the basic economic and social indicators.

The generalizing indicator of the development of the country's national economy, as we know, is the national income which is used for consumption and accumulation. Because of a number of factors that had been analyzed in party documents, the growth rates of the national income have decreased during the past 15 years from 41 percent under the 8th Five-Year Plan to 28 percent under the 9th, 21 percent under the 10th and 17 percent under the 11th Five-Year Plan. There has been a corresponding reduction in the increase of all other economic and social indicators. The concept of acceleration is aimed primarily at an essential increase in the dynamism of our development. From 17 percent under the 11th Five-Year Plan the growth rates of the national income are intended to be increased to 19-22 percent under the 12th and 25-28 percent during subsequent 5-year periods so that during the 15 years remaining until the year 2000 the volume of the national income will almost double. The 12th Five-Year Plan should be the turning point in this respect. It is difficult to overcome immediately the inertia in the development of such a gigantic organism as the national economy of our immense country. Therefore for the 12th Five-Year Plan increased, but relatively moderate rates have been adopted. The most important task of this five-year plan is to create conditions so that under the 13th and 14th Five-Year Plans it will be possible to achieve a sharp increase in the national income and other indicators.

If the figures presented above were translated into indicators of the average annual increase in the national income, the task of acceleration would consist in raising the rates from approximately 3 percent per year under the 11th Five-Year Plan to almost 4 percent under the 12th and up to 5 and more percent during the 1990's. Of course the absolute volumes of the national income and other economic and social indicators will increase more significantly. Thus the absolute increase in the national income under the 11th Five-Year Plan (1985 as compared to 1980) amounted to 71 billion rubles and, correspondingly, under the 12th Five-Year Plan it will reach 96-111 billion rubles or will exceed the 1985 level 1.6-fold.

The higher rates of development of public production will make it possible, on the one hand, to satisfy the people's needs more fully and achieve a significant rise in the standard of living of the Soviet people, and, on the

other, to considerably increase the volume of capital investments necessary for technical transformation of our society's material base.

Of course the quantitative aspect of the program for acceleration is extremely important. But it is still not the main part of the party's economic strategy. The main thing is the new quality of the growth, and it will be manifested first and foremost in the change of the source of economic development, its structure and the very content of each percentage point of increase in production.

A New Quality of Growth--Intensification

A most important constituent element of the concept of acceleration of socioeconomic development is the changeover of the national economy to the path of intensification. Up to this point, as we know, we have developed with a predominance of extensive factors--as a result of drawing new resources into production: fixed production capital, capital investments, fuel, raw materials and labor force. A relatively smaller role among the factors in economic growth was played by increasing the effectiveness of the utilization of resources. To put it more simply, we have developed mainly through expenditures. This path, as was pointed out as early as the April (1985) Plenum of the CPSU Central Committee and the June (1985) Conference of the CPSU Central Committee regarding questions of accelerating scientific and technical progress, is lacking in prospects and it is leading the country's economy into a blind alley. The only alternative is to change the economy over to a basis of intensive development for which it is necessary to make the main source of development increased effectiveness of public production. This is a key problem of our future development, made more acute by the objectively manifested tendencies toward reducing the increase in production resources.

I have already written, including in EKO, that the last 5-year plan with a large increase in resources, which was typical of our country for a fairly long amount of time, was the 9th Five-Year Plan. In this respect it represented the 20-year period of postwar development (1955-1975). Then the increase in resources began to decline sharply. This tendency is continuing into the 12th and subsequent five-year plans (see table; all figures in percentages). In the 1990's the growth of production resources will hardly increase as compared to the 12th Five-Year Plan. And this means that the effectiveness of public production every 5 years (taking into account the increase in the national income of 25-28 percent) will increase by 17 to 20 percent as compared to 11-14 percent as calculated for the 12th Five-Year Plan and 7 percent which was achieved under the 11th Five-Year Plan (see table).

As we can see, the task of accelerating the country's socioeconomic development will be carried out under conditions of a reduced increase in production resources. This reduction is linked to: the numbers of the labor force--with the demographic consequences of the war and the need to redistribute the workers in the branches serving the population; the reduction of the increase in the extraction of fuel and raw material--with the deterioration of mining-geological and economic conditions for its extraction; fixed production capital--with the retardation in preceding five-year plans of the dynamics of production capital investments (their increase declined from

44 percent under the 9th Five-Year Plan to 23 percent under the 10th and 18 percent under the 11th Five-Year Plan).

	<u>9th Five- Year Plan</u>	<u>10th Five- Year Plan</u>	<u>11th Five- Year Plan</u>	<u>12th Five- Year Plan</u>
Final result				
National income used for consumption and accumulation	28	21	17	19-22
Production resources				
Total--integral indicator*	21	13	9	7
Including:				
Fixed production capital	52	43	37	30
Products of the extraction industry	25	10	8	6
Number of people employed in material production	6	6	2	0.5
Effectiveness of public production				
Total--integral indicator**	6	7	7	11-14
Including:				
Output-capital ratio	-16	-15	-14	-7-9
Effectiveness of utilization of industrial raw material	2	10	8	12-14
Productivity of public labor	21	14	15	19-21

* The integral indicator of production resources was obtained by reducing all kinds of production resources to a unified measure through the indicator of the effectiveness of the individual kinds of them (by analogy with the calculation of adduced expenditures when capital investments are reduced to current ones through the norms of effectiveness). This reduction is permissible since all kinds of resources have a unified substance--labor, but it is embodied in various forms: in the form of embodied labor of the year (products of the extraction industry) and live labor, which can be measured by the number of people employed in material production.

** Calculated according to the indicator of the utilized national income

In order to provide for acceleration it will be necessary to increase the effectiveness of public production twice: both in order to compensate for the declining increase in resources and in order to provide for an increase in the rates of growth of the national income. It will be incredibly difficult to do this since it is necessary to make a radical change in the inertia that has appeared in our economy: to develop "peacefully," enlisting more and more resources with a moderate increase in effectiveness, which is practically the same from year to year (an average of 1.4 percent per year). But now, under the 12th Five-Year Plan, it is necessary to take a leap and accelerate the

dynamics of effectiveness 1.5-2-fold. To do this the growth rates of the productivity of public labor must be increased from 15 percent under the 11th Five-Year Plan to 19-21 percent under the 12th Five-Year Plan, that is, 1.3-1.4-fold. It is necessary to save 1.5 times more fuel and raw material, to increase the yield of final product per unit of fuel and raw material from 8 percent under the 11th Five-Year Plan to 12-14 percent under the 12th, and to reduce the output-capital ratio by half (from 14 to 7-9 percent).

And all this must be done in the immediate future--during the years of the five-year plan that has just begun. At the same time it will be necessary--we emphasize once again--during these few years to create conditions and prepare prerequisites for an even sharper increase in the effectiveness under the 13th and 14th Five-Year Plans. Under these five-year plans it will be necessary to increase the productivity of public labor by an average of 30 percent and more since on the whole during the 15-year period up to the year 2000 it is intended to raise the level of productivity of public labor 2.3-2.5-fold and the main burden will fall on the 1990's.

Correspondingly, the effectiveness of the utilization of fuel and raw material will have be increased from 8 percent under the 11th Five-Year Plan to 12-14 under the 12th and even more during each of the subsequent five-year periods. Finally, as was especially emphasized in a report by N. I. Ryzhkov at the 27th Party Congress, it will be necessary by the middle of the 1990's to stabilize the output-capital ratio in the national economy, and then to increase it. For on the whole during the next 15 years it is intended to increase the production potential by approximately the same amount as the national income--double. For comparison let us note that in the preceding 15 years the country's production potential (fixed production capital) increased 3-fold with an increase in the national income of only 80 percent. From this comparison alone it is clear how great the qualitative change must be in increasing the effectiveness of public production. While in the past an average of two-thirds of our economic growth was achieved as a result of increasing resources, that is, extensively, and only one-third as a result of intensification and increased effectiveness of the utilization of these resources, under the 12th Five-Year Plan it will be necessary to change this structure radically. The proportion of extensive factors will decrease to almost one-third, and intensive factors will take over the main position. And in the 1990's we must obtain the majority of the increase in public production (a minimum of three-fourths of it) on the paths of intensification.

I understand that I have wearied the reader who has had to make his way through a palisade of figures. But, alas, the economist has no other way of giving evidence than to rely on data concerning the dynamics of development. And plans for the future cannot be demonstrated with your hands either--it is necessary to have clear-cut quantitative indicators behind which stand qualitative changes, in this case, a complete change in the sources and factors of the development of our economy.

Let us continue the analysis.

An increase in effectiveness can be achieved by two paths. The first is through mobilization of organizational-economic and social reserves, by

utilizing the existing potential better. This source can be put to work immediately and one can say without exaggeration that it is already working for acceleration. Let us recall the events of the recent past. In the fourth quarter of 1984 and the first quarter of 1985 the rates of economic development dropped significantly. The severe winter had an effect but the main reason for the negative tendencies lay in the poor organization and the weakening of order and discipline. I must say that the volume of industrial production during the first quarter of 1985 as compared to the corresponding period of 1984 increased by only 2 percent. Immense efforts were needed in order not to let this unfavorable tendency develop and to change the situation. The April (1985) Plenum of the CPSU Central Committee called upon the workers to provide for unconditional fulfillment of the plan, for which it was necessary to increase the growth rates of industrial production to 5 percent. And this, as we know, was done. On the whole for the year, in spite of the slowing up in the first quarter, the increase in industrial output amounted to 3.9 percent, as was envisioned by the annual plan without any adjustment. More energetic work for utilizing the organizational-economic and especially the social factors associated with man's behavior made it possible during the first months of 1986 to achieve even more significant successes. As I write these lines we know the results of the work for the first 3 months: industrial production increased by 6.7 percent as compared to the corresponding period of last year. I do not recall anything like this during the past 8 years! Of course we must not overestimate the data of quarterly dynamics. As the people say, do not count your chickens until they hatch. But all of these figures, which essentially exceed the earmarked plans, show the great possibilities for improving things. And yet we have touched on only very surface of our reserves--as a result of somewhat better organization and strengthening of discipline. It is necessary to put into operation such powerful levers as improvement of management, increased interest in the results, and restructuring of the economic mechanism. Such measures will begin to be conducted and the effect from them is still in the future. But regardless of how great these organizational, economic and social reserves and possibilities may be, they are still limited and as they are utilized it will be more difficult to maintain the rate that has been established. And we must not simply maintain that rate, but even increase it! For we must make our base leap during the 1990's. We must understand that this leap can be made mainly as a result of scientific and technical progress.

In order to obtain the necessary return here it is not enough to have models of new technical equipment. It is necessary to mass-produce new technical equipment and use it in the branches of the national economy. And this requires time and money.

I shall give an example. There are hundreds of thousands of 5-ton ZIL's working on the roads of the country. The vehicle has been produced for more than 20 years, it has a 150-horsepower carburetor engine which uses an average of 28 liters of gasoline per 100 kilometers of travel. Of course it is necessary to improve the utilization of these vehicles like all cargo transportation and there are many reserves and possibilities here: as a result of better repair and service of the vehicles, better loading, more economical maneuvering of the travel, and so forth. As a result it is possible to reduce the expenditure of fuel somewhat.

But a radical change will come only when the outdated machines are replaced by the new ZIL's with the 180-horsepower and a fuel expenditure (incidentally, it is two-thirds the cost) of no more than 19 liters per 100 kilometers of travel. Because of the large capacity of the ZIL diesel, as a part of a truck train it can haul 3 tons more cargo than its predecessor; so the expenditure of fuel per 1 ton of cargo that is transported is even less.

But in order to obtain the national economic effect from the new truck it is necessary, in the first place, to conduct a complete reconstruction both of the head plant of the AvtoZIL Association in Moscow and its branches, which will require more than 2 billion rubles in capital investments and a good deal of time. This reconstruction is in full swing and by the end of the 12th Five-Year Plan ZIL diesels will be included in the overall transportation flow. And the effectiveness of this changeover will increase with the years as diesel vehicles replace the preceding generations of gasoline vehicles. As a result, during the 1990's we shall begin to attain a large and ever-increasing return. But the basis of the return will be laid under the 12th Five-Year Plan.

The situation will be exactly the same with many other industries. The main effect from scientific and technical progress, the prerequisites for which are being created now, will be obtained by the country in the 1990's. This is precisely why for the 13th and 14th Five-Year Plans we have envisioned higher rates of general development. The scientific and technical constituent will occupy the major proportion in increasing effectiveness.

Such is the future. But in order to bring this time closer it is necessary today to multiply our efforts for implementing the new investment and structural policy proclaimed by the party. Herein too is clear evidence of a new quality of growth.

The new investment in structural policy is aimed toward the creation of conditions for mass utilization of new technical equipment and technology in the national economy which are embodied in the highest achievements of science. Central attention shifts here to the production of machines, equipment and instruments for all other branches of the national economy. While under the 11th Five-Year Plan the volume of capital investments in machine building increased by approximately 30 percent, under the 12th Five-Year Plan it is to increase by 80 percent. Half of the immense capital investments will be used for technical reconstruction and reequipment of machine-building enterprises, with the introduction of advanced metal-processing technology here. About half of all the equipment in machine building at the beginning of the five-year plan will be replaced by new, more productive and effective equipment by 1990.

The new technical base for machine building will make it possible to change over to producing the most modern technical equipment, having replaced the majority of what is produced today with principally new machine-building products. The annual updating of the machine-building products is intended to be increased to 13 percent in 1990 as against 4.5 percent in 1985. Moreover the Basic Directions, adopted by the 27th Party Congress, envision that the

new machines and equipment should have labor productivity and reliability that is no less than 1.5-2 times greater than that of the equipment that is now produced.

Let us emphasize that we are speaking not simply about changing over from the output of outdated kinds of technical equipment to the production of individual kinds of new technical equipment. We shall produce interconnected systems of machines and equipment which in complex will provide for changing over in various branches of the national economy to new technological systems with higher effectiveness.

With a radical qualitative transformation of machine building there arises the task of increasing the rates of development of this leading branch of the national economy. Under the 11th Five-Year Plan the overall volume of production of the machine-building complex increased by 35 percent and under the 12th Five-Year Plan it will have to increase by 40-45 percent, that is, a 1.9-fold increase over industry as a whole. This will strengthen the priority positions of machine building in the national economy and, the main thing, it will build a powerful base for technical reequipment of the entire production apparatus of the national economy.

Mass production of new technical equipment will make it possible to begin a radical technical reequipment of all branches of the national economy and will make it possible to introduce the most advanced technologies. This reequipment during the course of technical reconstruction of public production is a strategic line of the economic policy. As early as the 12th Five-Year Plan the proportion of capital investments used for technical reconstruction and reequipment in the USSR national economy will increase from 37 percent in 1985 to 50 percent in 1990. And on the whole more than 200 billion rubles in capital investments will be used for technical reconstruction in the next 5 years, that is, more than was allotted for these purposes during the past 10 years. The coefficient of annual removal of outdated equipment will increase by an average of more than twofold—to 5-6 percent.

The main problem now is to carry out technical reequipment more rapidly and change over to the production and extensive dissemination of new technological systems that are based on new generations of technical equipment which will provide for a large leap in the effectiveness of production, will sharply (2-3-5-fold) increase labor productivity, and will greatly reduce expenditures of fuel, raw material and processed materials. And all this will take place mainly without increasing the capital-output ratio of production. This means that primary attention must be devoted to the degree of economy of new technical equipment and technology. The most important thing when selecting progressive technical decisions should be their economic effectiveness.

Because of the special significance of the machine-building complex for a qualitative transformation of the society's productive forces, the CPSU Central Committee and the USSR Council of Ministers in 1985 adopted a developed decree concerning further development of machine building. This document is essentially a state program for advancing this key sphere of the national economy.

The new investment and structural policy will lead to a change in the content of each percentage point of growth of our national economy. While now a 3 percent average annual growth of the national income is largely increased by the increase in the output of traditional, partially outdated products, a 4-5 percent growth in future five-year plans will be related mainly to a sharp increase in the output of qualitatively new products that are more effective and productive. We have already discussed the rapid replacement of outdated machine-building products. The same thing will happen in other branches, particularly in the chemical industry. As we know, a comprehensive program has been adopted for chemization of the national economy. Even under the 12th Five-Year Plan the volume of chemical products is to increase by 30-33 percent, that is, it is to develop 1.5 times more rapidly than the social product as a whole increases.

With the planned increase in the volume of industrial production under the 12th Five-Year Plan of 21-24 percent, the proportion of industrial products of the highest quality category will increase 1.9-2.1 fold.

Thus intensification on the basis of the extensive utilization of the achievements of the scientific and technical revolution is the major condition for the new quality of growth of the Soviet economy.

The New Quality of Growth--Social Priorities

Another most important characteristic of the new quality of growth is its social direction. On the basis of acceleration of the country's socioeconomic development there will be a sharp turn in the development of the national economy in the direction of solving social problems, above all improving the well-being of the people and consolidating the socialist way of life. Here it is intended first and foremost to solve the most critical and pressing social problems.

The most important of these problems is improving nutrition for the population, for which it is intended to more than double the growth rates of agricultural production. While under the 11th Five-Year Plan the volume of agricultural output increased by 6 percent as compared to the 10th Five-Year Plan, under the 12th Five-Year Plan this indicator is set at the level of 14-16 percent, which essentially exceeds the growth rates of agriculture under the 9th (13 percent) and 10th (9 percent) Five-Year Plans.

The achievement of the goals that have been set will require a profound restructuring of the entire agroindustrial complex. This restructuring has already been started and will be continued. We are speaking about extensive application of intensive agrotechnologies, the changeover to a principally new structure of management of the agroindustrial complex, and the introduction here of a new economic mechanism that corresponds to the new tasks.

One more of the most important problems is to saturate the consumer market with a broad assortment of high-quality goods and various services. To this end a special comprehensive program has been adopted for producing consumer goods and developing the sphere of services. It envisions accelerated development of these branches. For example, light industry under the 11th

Five-Year Plan increased the volume of production by 8 percent, and under the 12th Five-Year Plan these rates will more than double. On the whole, the production of nonfoodstuffs will increase during the 5 years no less than 1.3-fold. Moreover the output of goods for cultural-domestic and household use will increase 1.3-1.5-fold. The volume of paid services to the population is increasing 1.3-1.4-fold with an improvement in their quality and the art of service. But major attention will be devoted not to the quantitative indicators, but to the updating of the assortment and quality of consumer goods. In this connection increased demand is being placed on machine-building branches: they must deliver the most modern equipment for the production of consumer goods; the chemical industry--it must deliver high-quality materials. In this same area cooperation will be expanded with the socialist countries. The leading foreign firms will be enlisted in the production of high-quality consumer goods. In order to put an end to the currently existing serious disparity between the production of goods for the population and the real demand and in order to avoid "working for the shelf" whereby a large volume of unsold goods have to be marked down, it is necessary to radically change the economic ties among the population, trade and the producers of consumer goods. At the party congress they mentioned the restructuring of the economic mechanism in light industry: here it is necessary to sharply limit the range of directive assignments for the enterprises. Their plan will be formed on the basis of agreements with trade organizations which, in turn, must be responsible for making sure that their orders correspond to the demand of the population. Interbranch production and industrial associations will be created for manufacturing and selling light industry goods and for expanding firm trade.

A great deal of attention will be devoted to providing the population with housing. During the past 15 years the USSR has introduced about 1.5 billion square meters of housing--approximately 30 million apartments. During the next 15 years, with an overall improvement in the quality of housing that is introduced as well as its comfort, it is intended to construct more than 2 billion square meters or 40 million apartments. As calculations show, this will be sufficient for carrying out the task set by the party: by the year 2000 to provide every Soviet family with a well-built individual apartment or house. To do this it is necessary to seriously increase the volume of housing construction, which during the past 5 years has stabilized at the level of 500-550 million square meters. Under the 12th Five-Year Plan it is intended to construct residential buildings with an overall area of 570 million square meters and at the same time develop a powerful construction base for housing construction so that under the 13th and 14th Five-Year Plan we can introduce more than 700 million square meters of housing during each 5-year period.

Among the social problems special significance is attached to changing the content of the labor of the Soviet people, making it more attractive and creative, and eliminating heavy, monotonous and uninteresting. To do this it is intended to sharply reduce the application of manual labor. Now about half of all the workers and kolkhoz workers in the national economy are employed in manual labor. And by the year 2000 their proportion will decrease to 15-20 percent. That's the number of workers employed in manual labor will be reduced to one-fifth to one-third the current number. In order to imagine the immensity of this task let us recall that during the past 15 years the number

of workers employed in manual labor have decreased by a factor of approximately 1.2. It is clear that this program will require purposive work for comprehensive mechanization and automation of production. Even under the 12th Five-Year Plan, for example, the level of automation of industrial production should double. Measures for organizational development of production and deeper specialization and concentration of auxiliary productions will be directed toward this.

There will be a sharp increase in the creativity of the labor of engineers and employees on the basis of extensive utilization of computer equipment and automated systems that are based on this. Because of the development of the spheres of services, trade, and public catering and the increased sales of modern household equipment, there should be a considerable reduction of labor expenditures in housework and thus the workers should have more free time. This free time can be effectively utilized for raising the general education, skill and cultural levels of the people and for rearing their children. In combination with the reform of the general educational school and the unification of training with labor and taking into account the forthcoming radical restructuring of the system of higher and secondary specialized education, all this will create conditions for forming a new type of worker who corresponds more to the modern state of development of public production.

Thus we are being pulled in two directions: by technical reequipment of production, which requires a more skilled worker, on the one hand, and the growing demands of the workers themselves on production, which is brought about by their increased education and culture, on the other. This will produce a qualitative transformation of the productive forces of our society and raise them to a new and higher level. In the final analysis this should lead to carrying out the program task set by V. I. Lenin and reinforced in the CPSU Program concerning the achievement in the USSR of the highest level of labor productivity in the world.

On the Path to a Radical Reform of Management

The new tasks for socioeconomic development require a deep restructuring of the system of planning and management as well as the entire economic mechanism. Comrade M. S. Gorbachev said at the congress: "Now the situation is such that we cannot limit ourselves to partial improvements. It is necessary to have a radical reform." We are speaking about creating an integrated, effective and flexible system of management that makes it possible to realize more fully the advantages of the socialist form of management.

The materials of the 27th Party Congress give an in-depth substantiation of the tasks and the basic directions for the restructuring of the economic mechanism. As in any matter, it is first of all necessary to clearly define the goals that are set for the new system of management and administration. In the first place the system must actually subordinate all our production to social demands and the satisfaction of the needs of the people. This means that it is necessary to put an end to the dictatorship of the producer over the consumer, to eliminate the shortages, and to arrange things so that the work of the supplier is conducted precisely in keeping with the demands and interests of the consumer. If this is done public needs can be satisfied with

the least possible resources. For today many resources are wasted: many actually unnecessary products are produced which either stand idle, like a considerable proportion of the machine tools and automated machines, or gather dust in the warehouses, bases and stores, as is the case with material supplies. With the increased scale of production this problem has been increasingly aggravated and has assumed immense significance. During the past 10 years, for example, the material circulating capital has increased considerably more rapidly than the gross social product and has greatly exceeded the normatives. An immense quantity of equipment that is standing idle or is being utilized poorly has led to a significant reduction of the output-capital ratio.

Another target point of the management reform which is inseparably linked to the first consists in orienting the entire system of management toward increasing effectiveness and improving quality and also accelerating scientific and technical progress. To do this it is necessary first of all to evaluate the results of production from national economic positions. And this can be done only if the system of prices is brought into line with socially necessary expenditures and the national economic effectiveness of the products is taken into account in the prices. Hence the importance of complete accounting for expenditures, and not only direct, clearly visible expenditures, but also expenditures that arise in other units of the national economy that are linked, for example, to using more costly resources in production or bringing in additional capital investments. But such a complete accounting for expenditures is possible, in our view, only with the introduction of payment for all kinds of resources. Then the accounting for the complete national economic result of the activity of the producer and the comparison of this with the complete expenditures will produce a real total indicator and will make it possible to judge objectively the effectiveness of production. Let us add that this is necessary but it is still not a sufficient condition for smooth operation of the economic mechanism. It is not sufficient because it is necessary to make direct connections between the results of the activity of the enterprise and the corresponding labor collective, on the one hand, and the wages, incentives and cultural-domestic goods which the collective has earned, on the other.

In the new economic mechanism it will be necessary to arrange things so that it is not the society as a whole, represented by the state, that is responsible for the inefficient work of one labor collective or another, but that collective itself must be held accountable for unutilized reserves and possibilities. And conversely: an additional effect which can be obtained as a result of hard work on the part of a given collective should be left to a considerable degree with the collective itself and should motivate it to improve its work further. Now, as we know, this is not the case. For what happens? The person who works the best does not necessarily have the highest wages, the best housing and so forth. Since there is a predominance of planning from the level achieved, the best results most frequently are distributed among the average workers, and reliable suppliers are given more and more difficult tasks, yet they are given the least increase in wages per percentage of increase in labor productivity, they are given poor incentives for additionally reducing the expenditures of labor and materials, and they are given no incentives at all for economic utilization of fixed production

capital. We must understand that those who are working on two shifts, from the standpoint of living conditions, are in a worse position than those collectives that are working on one shift. But such examples are not taken into account. Such a situation must be radically changed. And the principle for this change is extremely clear: the one who achieves the best results should have the greatest rewards.

And, finally, the third area for restructuring the system of management and control is the development of economic democracy, the enlistment of workers in management, and the encouragement of initiative and socialist enterprising. Of immense significance for carrying out these tasks is the instruction of the 27th Party Congress regarding the creation of councils of labor collective which will be able more effectively to take advantage of the rights of labor collectives that are envisioned by the corresponding law.

As we can see, the restructuring will take place on many levels.

Such a radical reform in management, of course, cannot take place all at once in the form of a campaign. This is a fairly complicated process which requires thoughtful, systematic work for a number of years. As we know, this work has already been started. As the preparations are made management agencies are being created from groups of interconnected branches, taking into account their specific features. These include the Gosagroprom and the Bureau for Machine Building. A task has been set to create an analogous agency for management of the construction complex. At the party congress a suggestion was made concerning joint management of a group of transportation ministries.

The new conditions for management that were introduced at the beginning of 1984 in a small group of ministries are now being applied in a more developed form at every second industrial enterprise.

In our opinion, it is impossible to give a simple evaluation to the large-scale experiment that is being conducted. It was conceived in the correct area for it is oriented toward expanding the rights and independence of production associations and enterprises. On the whole, its results can be evaluated as positive: the fulfillment of the plan for deliveries has improved, the growth rates of labor productivity have increased somewhat, and production cost has begun to decrease more rapidly. But this improvement in the effectiveness and quality has not been radical and in terms of its scale has not corresponded to the tasks of the 12th Five-Year Plan. In the final analysis this is related to the fact that the new conditions for management introduced during the course of the experiment can by no means be called a radical reform. Actually, this experiment was conceived as early as 1983 under other conditions when the task of accelerating the country's socioeconomic development was not so crucial nor was the task of qualitatively transforming public production and radically accelerating scientific and technical progress. Therefore the conditions of the experiment turned out to be half-measures and not radical changes. The independence of the enterprises and their rights have been expanded, but not as significantly as is necessary. The Big Brother attitude toward the enterprises and production association has largely remained and many previous instructions and provisions that impede initiative and enterprising continue to be in effect.

The new conditions for management turned out to be separated from the collective forms of organization and encouragement of labor, nothing new was added to material and technical supply, and this is vitally important for enterprises of the sphere whose initiative and creativity are most limited. Inadequate incentives were introduced for quality and technical innovations as well. In 1985 these incentives were increased, but they were no longer mandatory conditions for the experiment. It was precisely because of this that, on the one hand, the enterprises that had changed over to the experimental conditions had such remarkable successes in their work and, on the other, that there was a certain disenchantment on the part of management workers with the results of the experiment. Of course, various results were achieved. In places where they adopted the new conditions for management in a truly creative way and took energetic actions as, for example, in Belorussian light industry the progress in productivity and product quality was more impressive than it was in many other places. In any case, the economic conditions of the experiment still did not place the labor collectives in a rigid dilemma: either work better and live better, or work in the old way and live poorly. So far there are still those who work half-heartedly and live fairly well. And many have preferred this path. In 1985 those enterprises which had been operating under the conditions of the experiment for the second year earned less than they did in the first year when they enjoyed the additional benefits for supply and transportation service and when they were given more attention.

Therefore industry is continuing to search for more effective forms of management. In this connection a great deal of significance is attached to the experiment being conducted at the VAZ and the Sumy Machine-Building Association, which were changed over to self-financing through normative distribution of profit, and they had been granted greater independence and rights with the simultaneous increase in their responsibility for the final results.

Interesting results were obtained from another experiment in changing organizations over to collective forms and providing incentives for the labor of 46 shops and sections at Novosibirsk enterprises, where these collective forms included engineering and technical personnel along with the workers. The progress here was more radical. Labor productivity in these shops and sections increase by 14 percent during the year of the experiment, a 2.5-3-fold increase as compared to the past year and also as compared to analogous shops and sections that had not been changed over to these conditions. In places where the matter was arranged well and intelligently, there was a literal explosion in the initiative and labor activity of the people. During the year labor productivity increased by 25-30 percent. Apparently it is necessary to pay more constant attention to the principles of the collective contract. When carrying out a radical reform in management it might be precisely these principles that could expediently be placed at the basis of the entire system of incentives. The work experience of the few enterprises and organizations that have been changed completely over to the collective contract so far confirms this conclusion. EKO has written about the amazing results achieved when changing local construction organizations over to the collective contract--comprehensive technological flowlines for the

construction of gas lines. We should test this experience in a number of industrial enterprises as well, for example, in mines and timber-flling areas, where it is simpler to evaluate the results, and then at enterprises of other branches.

Of great significance for restructuring the system of management of industry is the changeover that is now being made from a three-unit to a primarily two-unit system of management. This work is being conducted actively in machine building enterprises where the majority of unionwide industrial associations (the middle unit of management) have been eliminated and production associations and enterprises are directly under the jurisdiction of the central staff of the ministry.

This restructuring of the management system organically included the formation of new production associations and the transfer of additional enterprises to associations that are operating efficiently.

It would be difficult to overestimate the significance of the tasks set at the July (1985) Conference of the CPSU Central Committee concerning integration of science and production in the branches of industry. A considerable proportion of the branch institutes which have been isolated from production, and many of them did not even have their own design bureaus and shops, are now being transferred to scientific-production and production associations. New scientific-production associations are being formed, each of which should become a signpost of scientific and technical progress in its branch. In particular, in machine building it is intended to create 150 new scientific production associations.

As was mentioned at the congress, exceptional results were obtained after the introduction of the new system of management in the Belorussian Railroad, where they managed to release 12,000 people during the year and to increase labor productivity during that same year by as much as it had been increased in this branch during the entire 5 years. As the minister of railways M. S. Konarev announced when speaking at the congress, now a plan is being developed for disseminating this experience to other railroads. In our opinion, exceptionally interesting results were also obtained during the course of the experiment in 10 automotive businesses of the RSFSR where they put an end to write-ups and the automotive transportation workers were oriented toward better service for their clients. Service quality improved during the year of the experiment and the expenditure of fuel was reduced by 18 percent. True, in many cases the statistical indicators of the utilization of the automotive fleet deteriorated in these businesses, but there is nothing surprising in that: for they obtained real report data for the year of the experiment, and in past years these data were formulated under the conditions of write-ups.

The experiment is also being conducted in the sphere of consumer services. Recently I had occasion to be in Estonia and visit the enterprise in Tallinn that is engaged in the repair of television sets. The new forms of contractual relations between the repair workers and the manufacturers of television sets make it possible to significantly interest the people in the results of the labor, which has led to more complete satisfaction of the needs of the clients for these services.

At the 27th Party Congress paths were earmarked for further restructuring of management in the economic mechanism as a whole. It would hardly be worth repeating all these points which were adopted with such enthusiasm by our economic personnel. Now the task consists in concretizing the earmarked directions and gradually changing over to an integrated system of management which would provide for carrying out the tasks set by the party for accelerating the country's socioeconomic development.

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SCIENCE, TECHNOLOGY, PRODUCTION TO BE INTEGRATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 25-42

[Article by B. Ye. Paton, president of the UkrSSR Academy of Sciences, Twice Hero of Socialist Labor (Kiev): "Tasks of Integration of Science, Technology and Production"]

[Text] "To increase the role of the USSR Academy of Sciences as a coordinator of scientific research work in the country, to increase its responsibility for the creation of theoretical foundations for principally new kinds of technical equipment and technology. To give priority to the development of fundamental science, which predetermined how public production reaches a qualitatively higher level. To increase the technical direction in the work of academic institutes. To analyze the activity of branch and republic academies."

--From the Basic Directions of the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000

Under modern conditions further development of the socialist national economy and intensification of production depend more than ever on a constant influx of significant results from scientific research and their rapid and effective utilization. Science is more and more visibly turning into a direct productive force of society and is bringing about a significant restructuring both in productive forces and in production relations. This process is embodied most fully in the integration of science and production. We are speaking about a conscious and systematic application of scientific achievements in order to solve concrete problems of production practice and the organization of special measures that are to provide for this application.

Experience shows that only with further strengthening of the ties between science and production is it possible to achieve accelerated introduction of scientific discoveries into life. The party orients scientists and engineering and technical personnel toward increasing the precision of long-range planning, promptly determining how crucial research objects are, accelerating planning development and being able to effectively organize the transformation of the scientific stockpile into industrial models as well as applying progressive technology expensively and rapidly in industry.

A task was set at the 27th CPSU Congress: "To bring the national economy up to the leading ranks in science, technical equipment and technology. To utilize more effectively the forms and methods of achieving scientific and technical progress that are inherent in socialism. To strengthen the integration of science and production, to improve organization and to reduce the time period for the development and assimilation in the national economy of technical innovations, scientific discoveries and inventions."

Goal-Directed Search for Organizational Forms of Integration

A most important problem of integration of science and production is the goal-directed search for organizational forms which would maximally contribute to the development and deepening of integration and organically unify large-scale production and modern science.

The main form of ties between science and production in our country is the State Plan for Economic and Social Development, which plays a decisive role in the acceleration of scientific and technical progress. It includes large-scale scientific and technical programs in whose implementation scientific collectives of all union republics participate. The UkrSSR Academy of Sciences under the 11th Five-Year Plan conducted scientific research work within the framework of 138 programs of union and republic significance. For five of them and also for 96 of the main assignments of the programs it was the head department. The works of the UkrSSR Academy of Sciences within the framework of these programs envisioned the solutions to fundamental problems of development, mainly of base branches of the national economy—the fuel and energy complex, metallurgy, machine building, agriculture and environmental protection.

The activity of the UkrSSR Academy of Sciences for implementing the state plan is augmented by extensive scientific and technical cooperation of research and production collectives which essentially accelerates the entire complex of work—from the idea to the introduction. Joint work between the UkrSSR Academy of Sciences and union and republic ministries and departments under comprehensive plans for scientific research and introduction have proved to be positive. At the present time institutions of the academy are carrying out more than 1,000 under 21 comprehensive plans with union ministries of the chemical, gas and aviation industry, chemical and petroleum machine building, the construction of petroleum and gas industry enterprises, nonferrous metallurgy, republic ministries of ferrous metallurgy, energy engineering and electrification, and so forth. The results of this cooperation contribute to reducing the energy- and material-intensiveness of the products, increasing the output-capital ratio, improving technical supply, eliminating manual labor, and reducing or completing eliminating pollution of the environment.

Joint work is being conducted with large enterprises and production associations on the basis of comprehensive scientific and technical programs. This form of scientific and technical cooperation makes it possible to efficiently introduce large technological developments on the scale of the production association with subsequent entry into the entire branch.

The UkrSSR Academy of Sciences has created an extensive network of problem branch laboratories whose activity is directed toward acceleration of practical realization of the existing theoretical stockpiles in order to solve concrete problems facing the branches of the national economy. Functioning in institutes of the Academy are 57 of these laboratories belong to 29 union and republic ministries and departments.

Agreements concerning creative cooperation between institutions of the Academy and industrial enterprises have become widespread. They contribute to rapid assimilation of the achievements of scientists, the implementation of comprehensive reconstruction of the enterprises, and mechanization and automation of production processes on a modern technical basis. Under the 11th Five-Year Plan institutions of the Academy fulfilled more than 1,200 of these agreements.

A special place in the activity of the UkrSSR Academy of Sciences is held by scientific and technical cooperation with oblasts of the Ukraine and the city of Kiev. The basis of this is composed of comprehensive target programs of scientific research and planning and design work. They are being carried out in the interests of more than 300 enterprises under various jurisdictions which are located on the territory of the republic. Participating in them are 68 institutions of the UkrSSR Academy of Sciences, 70 VUZes and about 130 branch scientific research institutes.

The efforts of workers in science and production to solve problems of a regional nature are united and coordinated by six scientific centers of the UkrSSR Academy of Sciences--Donetsk, Odessa, Kharkov, Lvov and others--whose influence extends to all oblasts of the republic. Their creation has become an important stage in the purposive work for developing the scientific potential of the UkrSSR Academy of Sciences and the Republic as a whole and its effective utilization in the interests of accelerated scientific-technical and socioeconomic development of all oblasts of the Ukraine.

The performance of a large volume of work under economic agreements also contributes to strengthening ties with production. This traditional form of cooperation makes it possible for scientists to react quickly to the demands of practice.

The active cooperation between the institutes of the UkrSSR Academy of Sciences and Production is producing goods results. In 1984 alone the overall economic effect from the introduction of their development into the country's national economy exceeded 1 billion rubles.

Modern Technology--The Bridge Between Scientific Theory and the Practice of Public Production

Acceleration of the country's socioeconomic development and the sharp turn in the direction of intensification of the economy are possible only on the basis of mass realization of the latest achievements of science, above all the latest technologies which make revolutionary transformations in entire branches of the country's national economy.

Modern technology is a unique kind of bridge that joins scientific theory to the practice of public production. A scientific discovery begins really to serve the society when it is embodied in technology. Therefore the creation on the basis of fundamental research of principally new technologies which provide for radical changes in production is the main part of the acceleration of scientific and technical progress and the most adequate form of comprehensive realization of its results in the national economy. Such an approach, which was developed by the Ukrainian SSR Academy of Sciences more than 10 years ago, is one of the basic principles of the work of the academic institutions.

The UkrSSR Academy of Sciences has many examples of successful embodiment of the results of fundamental research and effective technological solutions. During past years its participants have developed several hundreds of technologies of various levels and purposes which were used in many branches of the national economy. In particular, of great national economic significance are the technologies for producing new types of large diameter pipes which were created in the Institute of Electric Welding imeni Ye. O. Paton of the UkrSSR Academy of Sciences, and also a whole spectrum of technological processes for installation welding when laying large main pipelines. The theoretical basis for these developments was composed of the in-depth research of the physical and chemical foundations of the metallurgical processes, solid state physics and mechanics of destruction.

Fundamental research in the area of computer mathematics and theoretical cybernetics conducted by the Institute of Cybernetics imeni V. M. Glushkov of the UkrSSR Academy of Sciences has made it possible to develop a new principle for organizing the computation process and to create technology for designing and manufacturing multiprocessor recursive computers with superhigh speeds.

Technologies for dynamic heat pressing of highly durable powder items developed in the Institute of Problems of Material Science of the UkrSSR Academy of Sciences have become widely known in the republic. The highly productive technological lines have already been introduced at a number of plants.

Under the modern conditions of economic development there is a persistent need to create technologies that provide for solving production problems of an intensive type. Such technologies are a reliable basis for reconstruction and modernization of production, its technical reequipment, and a qualitative transformation of the society's entire material and technical base.

The creation of technologies requires a solid scientific basis, and this circumstance is becoming an essential feature under the conditions of the scientific and technical revolution. Empiricism can no longer serve as a reliable basis for modern technology, as was the case in the not-so-distant past. Therefore an increasingly clear-cut orientation of theoretical and experimental research toward solving problems of a technological nature is today becoming the prevailing tendency in the development of world science.

The need for a technological orientation for large scientific collectives gives rise to a tendency toward increasing theoretical and experimental

research with applied developments and leads to the appearance of a principally new class of research--goal-directed fundamental research.

This kind of research is replacing the traditional forms which are typical of the so-called "pure" science. Being just as fundamental and profound as the latter, they are immeasurably more effective. It is no accident that such large problems as thermonuclear synthesis, the conquest of space, and the creation of electronics computer equipment require goal-directed fundamental research from the very beginning. In the current stage, a process is beginning which is transforming this research from individual phenomena to universal, mass research. The main advantage of this is that it is oriented toward obtaining final results in the form of large technological solutions.

The UkrSSR Academy of Sciences has many examples of successful goal-directed fundamental research and the creation of principally new technologies on the basis of this in the interests of key branches of the national economy--metallurgy, machine building, and the field and energy complex of chemistry. Among them is electroslag technology which has gained world recognition and became the basis for the creation of such specialized technological processes as electroslag remelting, casting, surfacing and welding, and laid the basis for such a new branch of industry as specialized electrometallurgy. One should also take note of the technologies for obtaining metal and nonmetal materials condensed in a vacuum, space technology of metals and so forth. In institutes of the UkrSSR Academy of Sciences of a material science profile, fundamental research has become goal-directed in many cases.

This process has also encompassed other scientific areas. Thus physicists of the UkrSSR Academy of Sciences have conducted comprehensive research and on the basis of this have developed a new technology for controlling the parameters of solid state semiconductor instruments. Goal-directed work in the area of mechanics and mathematics has led to the formation of an important area: technological thermodynamics.

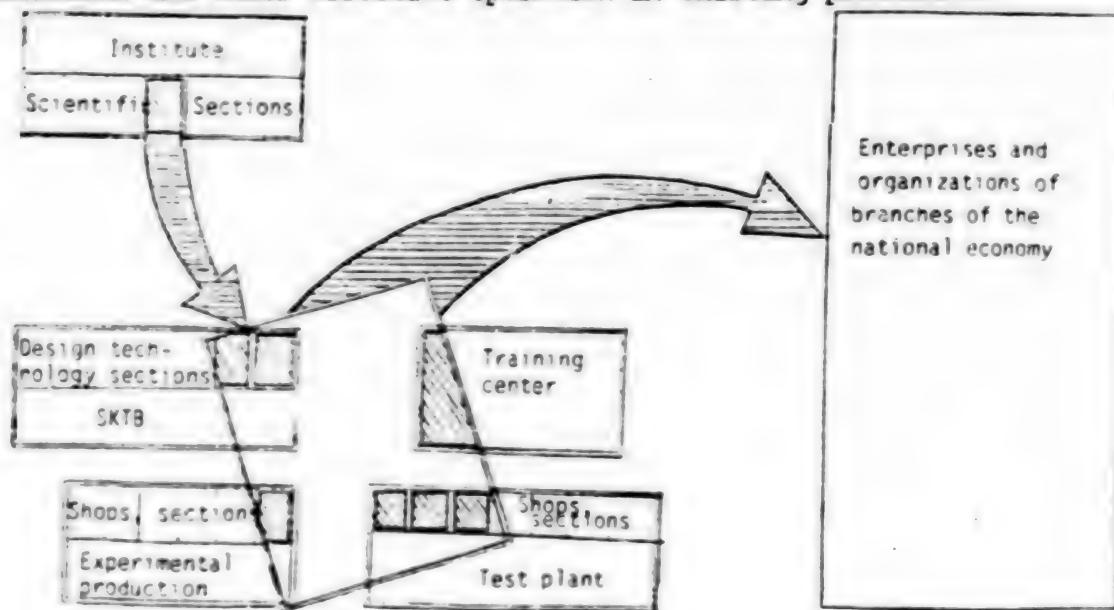
Engineering Centers--New Organizational Structures

The rapid development of goal-directed fundamental research is exerting a more and more appreciable influence on the organizational structure of science as well, which previously was formed under conditions whereby fundamental research and the technological application of its results were considerably separated in time and space. Goal-directed fundamental research has acquired a new structure of scientific institutions which will correspond to its content and tasks. A number of academic institutes which are developing goal-directed research during the course of a long period has essentially been transformed into large scientific and technical complexes (NTK) which include design-technological bureaus, experimental productions and experimental plants. They provide a clear example of the integration of science, technology and production.

A qualitatively new step in this direction was the creation of special problem-oriented subdivisions as part of the scientific and technical complexes of the UkrSSR Academy of Sciences. These are engineering centers which, based on fundamental research, are to contribute to the development of new technologies, materials and equipment and to provide for their large-scale introduction into various branches of the national economy.

Engineering centers become necessary when the realization of principally new scientific ideas that are of great practical significance are not provided for technically or technologically in the areas of application and when there are no specialists in these areas. This pertains first and foremost to development of an interbranch nature, many of which will not be adopted by the corresponded ministry or department. And yet the majority of large national economic problems arise precisely at the junctures of the branches. The numerous difficulties that must be overcome then are linked not so much to the content of the scientific and technical problems as to the lack of adequate organizational forms that are capable of reliably providing solutions to an entire complex of problems that arise during the process of the introduction of the innovations. Engineering centers are called upon to eliminate such obstacles on the path to scientific and technical progress.

The engineering center is a special-purpose creative collective which includes the number of divisions of design-technological organizations of the NTK which work in direct contact with the corresponding scientific division of the institute. The engineering center is assigned production capacities for experimental production and an experimental plant of the NTK. The strategy for research is determined by the scientific manager of the engineering center --the head of the scientific division of the institute, the results of whose research are receiving engineering and technological interpretation in the center. The leadership of the production and administrative-economic activity of the engineering center is provided by its director. The engineering center works under a unified plan which reflects scientific research, experimental design, startup and adjustment, and service work related to the creation of progressive technologies, equipment and materials, their large-scale assimilation and their effective operation in existing production.



Specialists of engineering centers determine the efficient areas and volumes of utilization of large promising developments. Through their own effort or on the basis of cooperation, within extremely short periods of time, they organize the output of single models and trial series of the latest equipment, materials and other products which cannot be found yet and about which few people know. By coming to the engineering centers the potential consumers of the new technical equipment and technology can see it in action, familiarize themselves with its merits in detail, and obtain the necessary advice.

Another important task of engineering centers is to prepare proposals for the organization of series production of new technical equipment, to develop documentation for large-scale introduction of technologies, equipment and materials, and also to create new shops and sections and modernize existing productions. Engineering centers are assigned the functions of training skilled specialists for effective utilization in various branches of industry of the equipment and technologies that are being created.

Engineering centers work on a cost-accounting basis with production associations and enterprises of various ministries and departments which act either as clients for their products or as manufacturers of the necessary models of the latest technological equipment and materials. They help to overcome departmental barriers, thus providing a time advantage. By concentrating most of the work for the introduction of innovations and having authors' rights to them, they not only relieve the ministry of the task of solving many problems, but can also extensively modify the developments in the interests of the branches and improve their quality during the process of introduction.

At the same time engineering centers also relieve scientists of the extremely large expenditures of time on the organization of introduction, which makes it possible for the latter to concentrate on solving new scientific and technical problems.

Because of the activity of engineering centers, steady feedback is formed with industry, thus stimulating further goal-directed fundamental research in the interests of the branches of the national economy.

In the UkrSSR Academy of Sciences, the work for forming engineering centers began 5-6 years ago, but organizationally they were formed in 1984. At the present time there are nine such centers functioning in the UkrSSR Academy of Sciences. There are six of them in the scientific and technical complex, the Institute of Electric Welding imeni Ye. O. Paton: for pressure welding, electronic beam technology, robotization of the production of welded elements, electroslag technologies, protective and hardening surfaces, and explosive metal processing. In the NTK Institute of Cybernetics imeni V. M. Glushkov they have created engineering centers for microelectronics and (in conjunction with the USSR Gosbank) automated banking systems; the NTK Institute of Superhard Materials has created an engineering center for developing equipment with high pressures and temperatures for obtaining superhard materials.

The possibilities of successfully solving complicated scientific, production and organizational problems related to large-scale industrial assimilation of

principally new technologies are convincingly confirmed by the experience of the engineering center for pressure welding. Close cooperation on the basis of a unified plan of scientists of the institutes, designers and technologies of the OKTB and workers and engineers of the experimental plant make it possible in extremely short periods of time to develop modern welding equipment and arrange technological processes. It took only a little more than 2 years for the center to conduct scientific research, develop technology and manufacture the corresponding equipment for contact flash welding. This work was recognized by the Lenin and State prizes of the USSR and the UkrSSR as well as gold medals and international exhibitions. Firms from the United States, Canada, Japan and Austria have purchased licenses for the equipment and technology for contact flash welding. Each year the corresponding welding equipment worth up to \$2 million is delivered to these countries.

In 1984-1985, with the participation of the engineering center, the scale of the introduction of new pipe welding complexes was considerably expanded. We introduced 10 Sever-1 complexes, 15 pipe welding installations of the K-584 type, and 16 machines for welding construction elements, with an economic effect of more than 21 million rubles. We also prepared for interdepartmental testing three new pipe-welding installations which will be produced in series by enterprises of the Ministry of the Electrical Equipment Industry. Experimental design developments of new models of welding machines have been expanded. Two have been put into series production.

At the present time unique technologies and machines are being developed for welding items made of highly durable aluminum alloys, which will revolutionize machine building. For the Ministry of Construction of Petroleum and Gas Industry Enterprises new equipment is being created for contact welding of pipes with various diameters, including large ones--with a diameter of 1,420 millimeters. The application of this equipment at enterprises of the ministry under the 12th Five-Year Plan will make it possible to release thousands of highly skilled welders and increase labor productivity severalfold.

The activity of the engineering center for microelectronics of the NTK Institute of Cybernetics imeni V. M. Glushkov is directed toward the development and large-scale introduction of computer and control systems using microelectronics and microprocessor equipment. They have already created and tested under industrial conditions unique automatic operators for technological processes in the production of semiconductor integrated circuits. In the future it is intended to create, in conjunction with enterprises of the Ministry of the Electrical Equipment Industry, a flexible automated production of superlarge integrated circuits on the basis of automated shops, which will make it possible to essentially reduce the labor-intensiveness and energy-intensiveness of production and reduce the number of workers and production area to one-third and one-fourth, respectively.

The work of the UkrSSR Academy of Sciences for creating engineering centers was approved by the Central Committee of the Communist Party of the Ukraine. The work experience of the NTK The Institute of Electric Welding imeni Ye. O. Paton, which was given a high rating at the Conference of the CPSU Central Committee regarding questions of accelerating scientific and technical progress and by General Secretary of the CPSU Central Committee M. S.

Gorbachev during his visit to the Ukraine, shows that the modern scientific and technical complexes and engineering centers have a promising future. With their creation there will be prompt engineering and technical interpretation of large results from fundamental research and rapid movement of innovations to the branches of production.

The CPSU Central Committee and the USSR Council of Ministers have adopted a special decree which envisions the creation of interbranch scientific and technical complexes (MNTK) for the main directions of scientific and technical progress. Two of these have been formed on the basis of the NTK The Institute of Electric Welding imeni Ye. O. Paton and the NTK The Institute of Problems of Material Science of the UkrSSR Academy of Sciences. A decree has determined the economic and legal conditions for the activity of the MNTK, which should have a favorable effect on the qualitative indicators of the development and introduction of the latest technical equipment and technology.

The republic academy has begun preparing for the creation of eight more engineering centers which will be oriented toward solving problems of accelerating the development of progressive technologies, their large-scale introduction and their highly effective utilization in such areas as robotization of production, the development of shell and vibration protection elements, open-pit mining of minerals, insulation of pipelines with film coatings, the creation of polyethylene pipes, the utilization of nitrogen for storing produce, automated processing of bank information, and the creation of information computer systems.

The engineering centers have already done a good deal to accelerate practical implementation of the achievements of science. Their potential capabilities are such that they will be able to become a key unit in the introduction of the latest technical equipment and revolutionary technologies.

Production Should Gain From the Introduction of New Technical Equipment

As experience shows, the matter of technical improvement of production in the modern stage is determined to a decisive degree by how successfully we realize the forms of combining science and production that are inherent in socialism. Of great significance is the creation of an economic and management mechanism which would make it possible to utilize scientific and technical achievements to the greatest degree in order to obtain high economic results. The rates of introduction of innovations depend to a considerable degree also on how adapted this mechanism is to solving the problem and how actively we investigate and how efficiently we solve problems of improving organization, management and planning of production.

The interaction between scientific organizations and production enterprises concerning questions of introduction should be carried out on a mutually advantageous basis that is acceptable to both sides without giving rise to any crucial problems. In life, however, the process of introduction of new technical equipment and technologies turns out to be fairly difficult and painful, and it is impeded by a number of factors of an objective and a subjective nature.

The basis of these is the lack of correspondence between the entire system of economic relations and the management forms which regulate the creation and transfer to production of new technical equipment and technologies. The currently existing economic mechanism and the system of control and planning of scientific and technical progress are oriented at best toward initial introduction of innovations, which, however, cannot provide the national economy even the smallest part of the possible economic and social effect. Complete realization of potential capabilities that lie in scientific and technical developments presupposes their multiplication and the creation of a multiplying effect which goes beyond the boundaries of the enterprise and even the branch.

Departmental separation, the inadequate interest of industries, the lack of proper incentives, and the imperfection of exchange of information between science and production also have an effect. Evidence of this is the prolongation of the time periods for the introduction of new technologies to such an extent that they are frequently obsolete and do not produce the kind of return which they could have.

Extensive and efficient introduction of the results of scientific research into the branches of production should become a stable basis for the union of science and production and an indispensable law for their business communications and interactions. A major role in comprehensive acceleration and expansion of the scale of practical utilization of new technical equipment and technologies is to be played by the ministries and departments and industrial and production associations and enterprises. Ideally, production should not only utilize the developments proposed by scientists enthusiastically and quickly, but they should also actively seek them out. A certain rearrangement of the functional structure of production would contribute to this. It is necessary to essentially increase the proportion of testing and experimental enterprises, shops and sections and to envision reserves of production capacities without which any attempt to introduce technical innovations will be fraught with an unjustifiably high degree of production risk. On these state claim one should envision not only the corresponding capacities, but also reserve funds for efficiently carrying out various aspects of introduction. The economic mechanisms should be regulated so that the enterprises and ministries actually gain from active and energetic work for large-scale introduction of new technical equipment and technologies and intensive management.

It is also necessary to shift emphasis in the structure of evaluation indicators, sharply increasing the authority of those which reflect the technical level and rates of technological updating of production, the level of labor productivity, the relatively smaller number of workers, and so forth.

The practice that exists in the country of developing and approving new state standards and normative-technical documentation and also updating already existing documentation lags significantly behind the rates of scientific and technical progress. This, in turn, frequently acts as an impediment to the introduction of progressive technologies and models of new technical equipment. It is necessary to revise all existing normatives and bring them in line with modern requirements.

It is also important on the plane of the development of science and technology to make it mandatory to envision the final and most important stage of the cycle "Science—Technical Equipment—Production"—large-scale introduction of technical innovations. Here it is necessary to establish an effective system of selection and coordination of assignments for introducing promising developments. It is also necessary to improve the system of organizational forms and incentives that are called upon to reliably provide for rapid and mass utilization of the latest achievements of science and technology.

A factor of no small importance in increasing the interest of scientists in advancing the results of their research into production would be granting scientific research organizations the right of authorial supervision over introduction.

When solving problems of large-scale introduction it is necessary to utilize more actively the possibilities of the regional system of control of scientific and technical progress. This means that assignments for introducing scientific and technical innovations should be reflected in the plans of the enterprises, regardless of their departmental jurisdiction.

The main task is to make the economy maximally receptive to scientific and technical progress and to make all units of the national economy vitally interested in this. This was the focus of the decree of the CPSU Central Committee and the USSR Council of Ministers, "On Extensively Disseminating New Methods of Management and Strengthening Their Influence on the Acceleration of Scientific and Technical Progress," which was published on 4 August 1985. It earmarked the main directions for further improvement of the economic mechanism and developed basic measures for accelerating the rates of development of public production and improving qualitative indicators of the work of branches of the national economy.

The effectiveness of the national economy today and in the future is directly dependent on the degree to which we succeed in bringing science closer to production and production closer to science. The experience of the UkrSSR Academy of Sciences shows the need for an active position on the part of scientific collectives in questions of integrating science, technology and production. Work in this direction is an important and responsible matter which contributes to accelerating scientific and technical progress in the national economy and reaching new levels of quality in technical reequipment of production.

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NEW FORM OF MICROELECTRONIC RESEARCH DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 42-47

[Article by A. S. Pankov and S. F. Prokopchuk (Kiev): "An Engineering Center for Microelectronics"]

[Text] "Good morning, comrades! The machine welcomes you...." An unusual, steely voice. The people around the exhibit come closer to the person in charge of the stand. Everyone wants to talk with the machine.

"Shall we change the dictionary?" one hears from the metallic tongue. "Which mode? Put input text for synthesis." And at the request of the visitors the operator either pronounces various words into the microphone or puts them into the machine via the keyboard.

Regardless of where the first domestic system of speech dialogue, Rech-1, is exhibited, it always elicits the most sincere interest from the visitors. A game? No--one more step on the path to establishing bilateral contact with machines.

In the future with the help of these machines it will be possible to use speech commands, for example, to control automated production complexes when restructuring the technological process.

This is just one example of the developments of the Institute of Cybernetics imeni V. M. Glushkov of the UkrSSR Academy of Sciences which is known for its achievements in the development of theoretical problems and new technical means for cybernetics and scientific fundamentals of automated systems for controlling technological processes, enterprises and branches of the national economy. During the years of the 11th Five-Year Plan in particular, fundamental results were obtained for constructing multiprocessor highly productive electronic computers and complexes, technical program systems of artificial intelligence, automatic robots and robot equipment complexes; new element bases and technological processes have been developed for microelectronics; and new mini- and microcomputers have been created for various branches of the national economy. Research on information medical, biotechnological and diagnostic systems has been further developed.

The high level of the institute's developments is evidenced if only by the fact that during just 4 years of the 11th Five-Year Plan it acquired 587 authors' certificates for inventions and 57 patents. And, naturally, one wishes to complete this impressive list with the traditional question: will all the research that has been completed rapidly be applied in practice? And the answer will be the traditional one: the problem of introduction is still not completely solved in the Institute of Cybernetics. And this in spite of the fact that they have achieved much more in strengthening ties with production than has been achieved in many other academic institutes of the country.

As early as the 1960's the organizer and manager of the institute, Academician V. M. Glushkov, emphasized that any discovery of an innovator remains a flight of fantasy if it is not reinforced by concrete development and introduction into production. He suggested concentrating the efforts of scientists in several of the areas that are most important for science in the national economy. Attempts were made to improve ties with enterprises. But even after this certain promising research never made its way into practice. And it was not the fault of the scientists. The "informal" relations that were established (like agreements for creative cooperation) were based only on moral factors and did not obligate either side to very much....

A great changed when several years ago a scientific and technical complex was created in the institute.

Production workers are frequently reproached for the fact that they are not enthusiastic about receiving the achievements of science and are in no hurry to utilize them. The reproaches are justified. But still, paradoxical as it may seem, there is a plus side to this conservatism. For not every innovation produces a significant effect, and the scientists must prove the advantages of their proposals not "on paper," but with an operating model of technical equipment.

In branch science this problem is now resolved relatively easily by scientific production associations. But what about academic science, which has neither its own designers nor its own experimental productions? The Ukrainian Academy of Sciences has begun to organize so-called scientific and technical complexes. At the leading academic institutes--of electric welding, cybernetics, superhard materials, problems of material science and low temperatures--they have created design bureaus and experimental and test productions. This structure makes it possible for the institutes to show what the commodity can do--to present their developments in reality and demonstrate their capabilities and merits.

Being convinced of the advantages of the new models of technical equipment and technological processes, the ministries have become more interested in the research of scientists and have started to finance branch problem laboratories within these institutes. The ties with enterprises and organizations of various branches have become more businesslike and concrete. During the 4 years of the 11th Five-Year Plan the state has saved almost 500 million rubles as a result of introducing the developments of the Institute of Cybernetics! It would seem that there is nothing to worry about now: contact with industry

has improved, people are waiting for computer equipment everywhere, and there is a good demand for the developments of scientists. But still here, following the example of the Institute of Electric Welding imeni Ye. O. Paton, they have gone further: they have created an engineering center for microelectronics--a new link in the chain of introduction. Why was it necessary?

The fact is that the branch laboratories are working for some single department. In science there are many problems that affect nationwide interests or at least those of several branches. Who can play the role of the "client" for these projects? Alas, these clients are far from always available, and important research of the institutes finds no practical application. The goal of the engineering center is to handle an area which is needed by everyone.

"Our microelectronics center," says the director of the Institute of Cybernetics Academician V. S. Mikhalevich, "has been given a concrete task: to accelerate the development and extensive introduction of modern means of microelectronics. We have conducted a considerable amount of fundamental research and there is a scientific stockpile which is of great practical interest for production."

The Engineering Center for Microelectronics is a new subdivision, but it was "cut out" from existing staffs of the SKB [Special Design Bureau] for mathematical machines and systems which belong to the institute. The money for the technological supply was not allotted by anybody in particular--it is also in the SKB as reserves. Although, one must note, that the center itself is quietly beginning to "earn money," acting on the basis of economic agreements with the enterprises.

We wish to emphasize once again that this is not a research, but a cost-accounting introduction subdivision which is based in the creation of innovations on the ideas and experimental production of the institute. It is important that the subject matter of its work is approved by the scientific council of the institute. This guarantees that the center's activity will be in the main directions and it makes it possible for it to engage in the introduction of all developments that are advantageous even if they are small. The general scientific leadership of the center is provided by the deputy director of the institute, Dr of Technical Sciences A. V. Palagin. Moreover, direct ties have been established with several subdivisions of the institute.

First of all, it creates systems of automated planning (SAPR) for so-called large and superlarge integrated circuits. Why has this area been selected? In the electronics industry, as perhaps in no other there is now taking place a rapid change in the products that are produced, and here it is especially important to reduce the time required for creating a new model.

Another direction in the activity of the engineering center is automation of technological processes and changing over to technologies that do not involve human beings. In the electronics industry the assortment of items that are produced is so varied (and demand for them is still increasing sharply) that the branches sometimes do not have the scientific potential to create any kind

of specialized, nonstandard kinds or to improve them. And the engineering center is prepared to fill this gap (if only partially, at the most critical points). And, of course, there is one more direction: the creation of computer equipment for solving all three of the problems listed above.

"All the work in which we are now engaged," noted the engineering center director, Candidate of Technical Sciences A. A. Snegur, "was done previously in the SKB, but it was dispersed as ordinary technical problems. Now they are concentrated, which makes it possible to develop, create and introduce new models of technical equipment and automated technologies more rapidly."

What practical work has the engineering center done in a short period of time? For example, in the Kiev Kristall Production Association they introduced an automated film developer. Any amateur photographer knows what boring and slow work it is to develop film. And if it is necessary to manufacture thousands of microcircuits for computers? The automated operator has relieved people of unproductive, unskilled labor. Its introduction at just one enterprises produces an annual economic effect of 180,000 rubles. Next in line is an automatic operator for thermal processing. It has already undergone production testing. These automated machines have been created for the first time and they have no analogue in domestic or world practice. Scientists assume that they have a great future since they can be used in various branches of industry.

It is clear what the industrial enterprise is receiving from the engineering center: technical innovation that is ready for application. But what does the institute receive? Is there any reciprocity?

Director of the Engineering Center, A. A. Snegur:

You cannot anticipate everything sitting in your office. Only a close tie with production helps to rapidly bring the model up to a condition that meets industrial requirements.

Scientific Manager of the Engineering Center, A. V. Palagin:

"On the one hand, the engineering center relieves scientists of the institute of the direct fulfillment of organizational and introduction tasks, that is, it acts as an intermediary between science and production. On the other hand, it causes the scientist to think about the technology of their developments and bring their ideas up to a condition so that it is possible to see that this has a future and a given production needs it."

Director of the Institute, V. S. Mikhalevich:

"The engineering center, having daily contact with production, places unsolved problems before us and stimulates the development of scientific thought. Additionally, business contacts with the enterprises make it possible to develop our experimental work. For it is known that providing the most modern equipment is one of the weakest places. So we and our clients have been convinced of the need and the viability of engineering centers. We shall create new ones."

The opinion of the scientists and the designers is unanimous: one more promising form of link between science and production has appeared. But it would be incorrect to think that everything is developing easily. There are still many unsolved problems. Up to this point they have not officially regulated interrelations between the engineering center and the enterprises. It is advantageous for the developers to produce as many samples of new technical equipment as possible--the economic effect and the material incentives for the workers depend on this.... But if they become involved in mass reproduction of one development, the engineering center grows into an ordinary production and remains at yesterday's level of science. Scientists and specialists of the engineering center have set the task of creating at a concrete enterprise fundamental, basic technology, and then the workers of other plants must use the results that have been obtained, taking into account their specific features.

The engineering center submits its developments to the enterprise. But this provides nothing for plant specialists: they are not materially interested because it is not their idea but "another's" that is being introduced. A good deal is said about this problem, but it is still not being resolved.

In the legal and financial sense, the engineering centers have not yet been legally formulated as scientific and technical complexes. They operate on the basis of decisions of union republic agencies alone. Hence there are many difficulties and paradoxes. Thus in a scientific and technical complex there are cost-accounting organizations (design bureaus) and budget organizations (the institute itself) that are operating jointly. They are joined together only by the planning of the subject matter. Kievan scientists have achieved the creation of unified party, trade and Komsomol organizations. This helps to coordinate the activity of the subdivisions of the complex. But friendship is friendship and working together is something else. Wages and bonuses for the workers are paid differently. The cost-accounting organization can resolve social problems with incentive funds, but a budget organization cannot.

The official establishment of the status of engineering centers and scientific and technical complexes would make it possible for academic institutes to link their work more closely to the concrete tasks of industry and this means to achieve more rapid technical reequipment of enterprises and entire branches.

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BERDSK RADIO PLANT PROGRESS REPORTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 48-65

[Interview with A. N. Shkulov, director of the Berdsk Radio Plant, Hero of Socialist Labor (Novosibirsk Oblast) by N. M. Zhuravel and Ye. L. Lysaya: "The Berdsk Radio Plant: Scientific and Technical Progress and Satisfaction of Demand"]

[Text] In formulating the strategy for accelerating economic development in the political report to the 27th Party Congress, General Secretary of the CPSU Central Committee M. S. Gorbachev noted that the main means of achieving this are "scientific and technical progress and a radical transformation of the society's productive forces. On the previous material and technical basis it is impossible to achieve radical changes. We see the solution in deep reconstruction of the national economy on the basis of the latest achievements of science and technology and breakthroughs in the leading areas of scientific and technical progress."

Radical transformations of production on the basis of the achievements of science and technology—the concept of the development of the Berdsk Radio Plant comes from this. There has been a stable demand for products of this enterprise for many years. Today under the trademark of "Vega," the country produces about 16 percent of the household radio equipment. The Berdsk workers are trying to lay a path to the hearts of the consumers through the utilization of the latest achievements of scientific and technical progress in their items. But in order to produce modern radio equipment it is necessary to have radical transformations in the production itself and a sharp rise of its technical level. The Berdsk workers have extremely instructive experience in comprehensive mechanization and automation of the enterprise on the basis of flexible production systems and robot equipment complexes.

We offer for your attention a selection of materials concerning the Berdsk Radio Plant.

[Question] Aleksandr Nikolayevich, how did the tradition of producing high-quality products come about at the Berdsk Radio Plant? What are the prospects for its further development?

[Answer] In terms of the actual development of the production of the radio electronic equipment, in Berdsk the collective has behind it decades in which it has accumulated qualitative and quantitative indicators, as a result of which the tiny peripheral plant which used to produce third-class radios has become one of the leading ones in the branch. During all these years we have extremely actively developed the subdivisions, without which the modern radio technical complex could not exist nor could equipment of a high technical level be created. The enterprise can fully influence the level of output in production only if it has its own design subdivisions. Otherwise it is always having to be dependent on outside developers and to be satisfied with those designs which it is offered. Having created a plant design bureau for household radio equipment in 1972, we were able to give it the task of changing over from third-technical equipment to the production of complicated modern items of the first and second classes.

Two years ago the plant organized a new design-technical subdivision which created completed assembly units of radio equipment on the latest element base. True, it has to engage in the development of the element base itself, since the Ministry of the Electrical Equipment Industry does not fully satisfy our needs, and without microelectronics it is impossible to produce items that are in great demand.

The new subdivision cooperates closely with enterprises of the Ministry of the Electrical Equipment Industry, branch scientific research institutes and the Siberian Branch of the USSR Academy of Sciences. But even now it is clear that we will not succeed in radically solving the problems of creating household radio equipment at a world level. It is necessary to study and utilize the achievements of fundamental science and branch-scientific research institutes and design bureaus in the areas of physical optics, laser technology, chemistry and so forth. Therefore, even today there is a persistent need to create a scientific and technical center at our plant which studies the achievements of science and technology and concentrates their application on new items, developing this work to the stage of an advanced plan.

It would be expedient to create a unified coordination scientific center of the Berdsk Radio Plant and the Siberian Branch of the USSR Academy of Sciences.

We have also had to create our own new production subdivisions, and not under very favorable conditions. In order to imagine them one should recall that in Berdsk--a small suburb of Novosibirsk--several large enterprises of various branches developed at once. There was not a trace left of the anticipated surplus of labor resources. Understandably, we could not count on the oblast center. On the contrary, every day workers take the morning streetcars from

Berdsk to work in various enterprises and institutes of the city with a million people. The neighboring Akademgorodok, which is only a couple of kilometers away from us, as you know, itself needs skilled workers for its shops and experimental productions. Our developers have begun to be rated highly there too.

We conclude agreements with certain enterprises for long-term direct production relations. For example, we do not have any direct administrative tie with the Sibir Musical Association which is located in Novosibirsk. It is under the jurisdiction of Rosmuzprom. But we have concluded a long-term agreement for 20 years with Sibir, which clearly specifies the volume of work to be performed for us. It comprises four-fifths of the overall production volume of Sibir since the demand for musical instruments has decreased sharply (the association produces pianos and accordions). Such interrelations are better than ordinary cooperation or even deliveries under direct agreements since in this case the partner has a great deal of interest and responsibility. Frankly, I think it would be more correct if Rosmuzprom transferred Sibirsk to us completely. The quantity of instruments planned for the Sibir Association could be produced at the plant. For us this would be like the production of consumer goods.

This is not the only case in which there is the problem of utilizing production capacities that are inactive or not fully loaded. There are many enterprises like this in the country. Raising the level of diversification and efficiently combining production would make it possible to improve the utilization of capacities and avoid dispersion of labor resources, which is extremely important right now. In my opinion, it is possible to reveal such productions and conduct a kind of inventory of them only if an active role is played by the territorial administrative agencies. This should be an interdepartmental action since the departments are not interested in transferring their capacities to other organizations, even if the capacities are not loaded.

In principle a great deal of flexibility and a great deal of independence for enterprises and associations are needed to improve organizational structures. Today's standard structures have largely become outdated and do not contribute to mobility of production or dynamic reception of the achievements of scientific and technical progress. It seems to me that the structures should be written into the established wage fund, but which subdivisions to create at one point or another and how, as well as the number of workers--these decisions should be left to the managers.

Flexibility in production and management are unthinkable without initiative and creativity. Routine and standard actions are just as counterindicated in management decisions as in technical decisions. But do many of us think very frequently about the style of management and analyze the quality of the work methods we use with subordinates and the collective as a whole, whether it be a shop, a decision division or a service subdivision?

We conduct training in economics and administration and invite qualified lecturers. You will agree that many interesting and correct points heard during classes and lectures frequently seem to be tangential and the person

doesn't see if they "fit" him directly. And then we decided that it is necessary to directly order the managers and specialists to think about management methods. The plan for economic training included the writing and defense of a report entitled "my workstyle." The defense turned into a lively conversation about the methods of management, during the course of which the opponents gave their recommendations.

Personal creative passports of engineering and technical personnel and employees contribute to mobilizing initiative. All large engineering solutions of the specialists, inventions and efficiency proposals are entered into the passport--on the one hand. The failure to fulfill assignments is entered--on the other. An entry in the passport influences the point evaluation of labor and the level of the bonuses.

The new stage of scientific and technical progress is characterized by a comprehensive transformation of productions. Under these conditions the traditional forms of interrelations of the developers of the means and systems of automation and mechanization and production subdivisions no longer suit us. It is necessary to search for new forms. At the enterprise every technological area of automation is headed by a head engineer. We have tested several variants of interaction between head designers of GAPs and shops. What are they?

In certain cases the head designer is at the same time the chief of a special design and technological bureau for a given area of GAP and the realization of developments is carried out in conjunction with the management of the shop on the basis of an established plan of organizational and technical measures. In another variant the head designer of the GAP is the shop chief (for example, of the stamp shop) and functionally he has jurisdiction over the manager of the SKTB for this area of automation. We had to relieve the shop chief of some of his current affairs. Understandably, with this kind of organizational structure his responsibility for the realization of the developments increased sharply. Now he can no longer say: "I do not have time for you, my main work is the production program." In still other cases we have appointed as the manager of the GAP a chief of several shops with the same profile, that is, a kind of production manager. While being in charge of current production, at the same time he selects the most effective ways to radical technical reequipment. He can see more clearly how to combine the introduction of new production without infringing on the interests of existing production. For all the work for automation and mechanization, reconstruction and technical reequipment in the association is carried out without halting production or reducing its volumes. On the contrary, from year to year the output of products increases at high rates. During the 11th Five-Year Plan it increased by 50 percent. Therefore flexibility in management is just as necessary as is flexibility in production. It is impossible in all cases of life to include a particular structure within the framework once and for all.

[Question] Specialists of your enterprise speak of the need to keep up with modern fashion as one of the most important tasks. In radio equipment there is probably an especially large amount of concern with this. For fashion is a "frivolous and capricious lady," and your items are extremely complicated.

[Answer] But still anybody who produces consumer goods must always keep fashion in mind and must be sure to be oriented toward it and actively influence it since the acceleration of scientific and technical progress and the raising of the cultural level and the domestic demands have led to a situation where radio equipment has become an indispensable part of our life. During 10 years the production of household radio electronic equipment in the world has doubled, and in our country it has tripled with the simultaneous increase in the numbers of models and makes and a complication of the items. Our country occupies third-fourth place in the world in terms of providing the population with radio equipment (per 100 families). So the field of our activity will be fairly large in the future as well.

The enterprise has set the goal not simply of keeping up with the fashion, but becoming its legislator. Do not think that such a statement is immodest and made for the sake of publicity. The fact is that there is no other way to develop production. For the market is already saturated and the consumer has been offered an immense selection. Under these conditions, in order to provide for stable sales of our items it is necessary not simply to be prepared to compete with the leading radio firms of the country, but also to outstrip them and enter into competition with foreign industrial companies. While recognizing the difficulty of the goal we have set, we still began to work in this direction in the 1970's.

[Question] What actions do you have in mind? What have you managed to achieve because of them?

[Answer] I am speaking about work directed toward raising the technical level of products and satisfying the tastes of the consumers, that is, the creation of items that are reliable, attractive and relatively inexpensive.

When studying the conditions of the world and the domestic market we can see a clear tendency--demand and production are increasing steadily for several groups of household radio equipment. First, for equipment of the highest class (or the "hi-fi class" and the terminology generally used on the world market (which is produced in the form of a set of individually functioning completed blocks. These blocks are manufactured only as stereophonic.

In the second place, there has been the most extensive development of television sets and video tape recorders with great functional capabilities right down to creating unified city information systems for all consumer services. Without leaving home a person can use it to obtain information about the availability of goods in a store and their external appearance; about the repertoire of theaters, movies and other events and their content; they can play chess with a computer, and so forth.

Third, small portable radio tape recorder combinations, tape recorders and automobile tape recorders are being developed as much as this group in terms of volume of production and sales. The peculiarity of our market is that so far there is still a demand (and there will be, according to our predictions, for another 5-7 years) for inexpensive stationary radios and music centers.

The overall tendency toward raising the technical level of equipment amounts to reducing the size and weight and increasing the reliability as a result of more extensive application of the latest generations of the element base, creating functional units on the basis of microelectronics, applying new methods of condensing tapes and gradually changing over to the digital method of coding, and using lasers in magnetic taping and reproduction.

Our enterprise is developing the production of radio equipment of a fairly broad spectrum from stereophonic functionally complete sets to small portable transistor radios and radio tape recorders. The volume of products in the highest class amounts to 10.8 percent, the first class--26 percent, and the third class--63 percent. I think that it is understandable that we are speaking not about the quality of the products, but about their class in terms of complexity and purpose. Of all of our products 80 percent are stereophonic. As concerns the quality in the broad sense, I should like to give these figures. The enterprise produces more than 50 percent of its equipment with the State Emblem of Quality. During past years this reliability has increased 1.5-fold and exceeded the normative. Because of this we have managed to increase the warranty period for our items 1.5-fold.

To influence fashion means to mobilely restructure production in keeping with the demands of the consumers and even to anticipate them. This is the first thing. Previously the rate of replacement was once every 5 years. Under the 11th Five-Year Plan we have provided for replacement once every 3 years, and under the 12th Five-Year Plan we intend to replace products even more frequently: once every 2 years.

In the second place, we are working hard on creating our own firm style of appearance of the product, we have succeeded to a certain degree, judging from the consumers' attitude. All the items are designed in the same manner; materials of light tones are used for finishing. The external appearance of many new items is registered as an industrial model. As we know, the State Committee for Inventions issues a certificate for an industrial model if the artistic design and execution of the item exhibit innovation or high aesthetic qualities.

Third, special attention is devoted to increasing the reliability of the equipment with relatively low prices.

[Question] Reliability is such an important parameter for objects for cultural and domestic purposes that we should like to discuss it separately. There is more and more technical equipment in the home. It facilitates life. On the other hand, people lose a great deal of time going around to the shops and finding all kinds of large and small defects in technical equipment. What is being done to increase the reliability of these items?

[Answer] During the past 5 years there has been a considerable increase in the demands on the technical level and the convenience of radio equipment (reducing the sizes, weight, compacting the tape recorders, convenience in operation, adjustment and so forth) and this has led to a situation where if the element base of the 1970's were used the number of elements applied would increase 10-fold. The reliability of the item decreases on the whole since it

is quite natural that the possibility of breaking increases in proportion to the increased number of elements. The problem is so serious that because of the unreliability of elements the possibility of further complicating the designs is in doubt.

The weakness of the element base influences the cost of the items. Thus the cost of radio elements with a digital laser player with the existing base is so high that there is no point in even creating it. For the proposed reliability of the product will be several times higher than the current reliability of these elements.

[Question] What is the solution?

[Answer] First, increasing the reliability of the element base by a factor of 1-2. Second, changing over to the application of functional microcircuits and large integrated circuits.

What is being done at the plant? First of all, it was necessary to introduce 100 percent scrapping of the elements. To do this, a special shop was organized for controlling incoming parts. About 100 people were employed in it and it was equipped with the controlling equipment that operates automatically. The specialists created installations for scrapping condensors and an automatic condenser which scraps plates. Our production shops were initially wary because the tester at first scrapped a large quantity of printed plates. But now nobody would think of working without it. It is better to get rid of defective parts in an early stage than when the final item is being checked or, even worse, when it gets into the hands of the consumer and he makes a complaint. For this tester our specialists received a certificate of the VDNKh. This is a development of the division for nonstandard measuring equipment of the plant design bureau for household radio electronic equipment. As you can see, the SKB had to create a department for scrapping means of controlling the parameters.

The next step was to prolong the technological trial periods for the items in all stages of production, from controlling the incoming parts to the output of the final product. In keeping with branch recommendations a 4-hour test period is envisioned. At the enterprise components and blocks are initially broken in and tested and then the item as a whole is tested for from 50 to 100 hours. The increased labor-intensiveness in the sphere of control is obvious. But it is impossible to do without this necessary measure: it is better for the shortcomings of the batching items to appear here than with the consumer.

Further actions: through our own forces we master the technology of microelectronics, which I have already discussed. In conjunction with the production association and enterprises of the Ministry of the Electrical Equipment Industry we develop a line of functional microcircuits.

The SKB of the enterprise has completed the development of two items in which circuits are completely replaced. Microcircuits and elements with a high degree of integration are used. This has made it possible to reduce the sizes and weight of the item while improving quality and increasing reliability. We are speaking about all the portable models of the Vega transistor radio and

the portable stereophonic radio tape recorder. With the old element base it was impossible to make a portable radio tape recorder. These two items are on a level with modern foreign items.

We have not refrained from using laser equipment either, but we are taking measures so that it will be less expensive, more reliable, and based on a new generation of electronic equipment. The Institute of Automation and Electrometry and the Institute of Semiconductor Physics of the Siberian Branch of the Academy of Sciences as well as certain scientific production associations are rendering assistance in creating a digital laser electrophone.

Laser disk players are already available abroad. They are expensive. The first of them costs \$1,200, later they cost \$800, and now their price is \$120. Laser equipment reproduces sound without distortion. Therefore if one is to think seriously about reaching the world level it is necessary to master this equipment as quickly as possible. This is a task of statewide importance.

Increasing the reliability of radio equipment depends on the tape drive mechanisms. But, in the first place, plants of the Ministry of the Electrical Equipment Industry do not produce electric engines for cassette tape recorders; in the second place, there are no hopes of obtaining good tape heads through cooperation. If the service life of a tape drive mechanism is already set for us, the reliability of the item as a whole also lies within the limits of this period of operation. We are working on creating a new tape drive mechanism of a high class with greater reliability. The peculiarity of this one is that it has almost no labor-intensive and high-precision mechanical parts and it does not have the ordinary motors. We have also entered into cooperation with the Novosibirsk Plant for Precision Machine Building. It is creating for us an Alsifer tape recorder head of a high-quality category, and we are making for them an acoustic system for the new Kometa tape recorder.

And, finally, the path to improving quality and increasing the reliability of the items lies in automation of production. There is still a good deal of manual labor in instrument building and radio electronics, and it is fairly monotonous, involving work on a conveyor. The monotony and uniformity are extremely tiring and cause mistakes. All one has to do is miss one element or put in one too many and all the complicated work of many people goes to waste. Automation of production on the basis of equipment that works according to a program makes it possible to eliminate many of the negative influences that are subjective in nature.

Without automation we will not be able to cope with the shortage of labor resources. By the year 1990 we are to increase the volume of production of products 1.5-fold as compared to the 11th Five-Year Plan, and the products will be of a higher technical level and complexity. Not only will there not be an increase in personnel, but on the contrary--there will be a slow reduction. The tasks can be carried out only through increasing labor productivity, primarily on the basis of automation.

At the enterprise we have developed a comprehensive program for automation which envisions automation of design-technological developments, production, control and management. In keeping with it it will be necessary to create mathematical models of equipment with the output of programs for manufacturing the basic components in production, to automate labor-intensive products, and to remove people from unattractive, dangerous and harmful production operations.

We have already managed to do a certain amount. In stamping production we have introduced 64 industrial robots and on the basis of these we have created automated lines and robot equipment complexes. Now we are assembling two flexible production modules which are controlled from computers. I think that by 1987 we will have completely automated cold sheet stamping, and by the end of the five-year plan we will have basically created technology that does not involve human beings here. The number of basic workers in the stamp shop has already been reduced by 100.

In the assembly and installation production we have started up the first section of the automatic line Trassa, which made it possible to release more than 70 people. We are continuing to reconstruct the shop and when it is completed it should be an automated shop for assembly and installation production and control.

This work helped us to complete the assignment for the 11th Five-Year Plan ahead of schedule, in September of 1985. Of course the people who were released from work positions were not fired, but transferred to other positions where they are more needed today--to the service for technical preparation of production and for adjustment and servicing of automated equipment.

[Question] Those large transformations which you have earmarked and are carrying out in a planned way probably entail large personnel changes not only quantitatively, but also qualitatively--in the level of qualifications and the composition of the personnel?

[Answer] Undoubtedly. For at the enterprise there is a process of radical change in the content of labor. In automated production the boundaries between the worker and the engineer are practically eliminated, and the volume of work of a purely physical nature is reduced to almost zero. Requirements for skills of workers and the level of their education are increasing. I can envision the radio plant at the end of the 20th and beginning of the 21st century: a highly automated enterprise whose collective in terms of occupational and skill composition approaches that of today's applied scientific research institute.

I daresay that by this time there will be no workers left at the enterprise. But this, of course, cannot be taken literally as a plant without a single human soul. But such occupation as installer of radio equipment, assembly worker, stamping machine operator, and smelter which are today considered mass occupations and which involve mainly manual labor will disappear forever. The leading occupations will be operators of robot complexes, programmers, engineer-electronics experts, designers and researchers. Most of the work

will be done by robots, automated systems of the Trassa type, and cybernetic devices. And today is exactly the right time to think about the plant's collective at the end of the 20th and the beginning of the 21st century. It will be based on those who are studying in the fifth-10th grades of the Berdsk schools.

[Question] But there are not only native Berdsk people working at the enterprise, but also graduates of institutes and teknikums of various cities of the country. It will apparently be necessary to retain them in the collective as well?

[Answer] Of course. And a good deal is being done to make sure of this. They are being offered prospects for growth and the necessary housing and domestic conditions are being created. Nonetheless there are still frequent cases in which young people, having worked the necessary 3 years after training, pack their suitcases and leave. But unless there are extraordinary circumstances Siberians do not change their place of residence. Therefore we are oriented primarily toward Siberians and especially Berdsk residents.

This is what happened once. About 10 years ago an institute graduate came to me to be hired and, although he was very confused, he still made an unusual request: "I want to be a manager." Toward such people, who are candid and open, I personally have a positive attitude. But without my help this engineer, and he turned out to be not only honest but also capable and able to think independently, traveled the path from a foreman to one of the plant's head specialists. He was offered an advantageous position in Moscow. But he flatly refused. A Siberian does not wish to leave his native city and plant.

Therefore the enterprise of the 21st century will require primarily involved and talented residents. And how and where and when better to reveal a person's capabilities for precise sciences than in his childhood, in school and in the circles for technical creativity. Unfortunately, the system of school education with its equalizing and weak professional orientation does not make it possible to find people who were born for the work. In order to discover at an early age someone who is enthusiastic and capable of working with radiotechnical equipment, electronics and cybernetics and to train the necessary specialist from him the enterprise has drawn up and is carrying out a large program.

The first familiarization and selection of capable children will take place in the "Republic Vega"--a sports and labor camp. Classes in circles of radio lovers, designers and "fox-hunting" make it possible to make the first selection. Beginning with the eighth grade these children, in addition to their school production practice, during which time they acquire the specialties of a welder, lathe operator and so forth, will be occupied in the club for technical creativity in the sections for robot equipment, electronics and cybernetics. We will enlist our own radio engineers to give lectures. A good production and technical base has been created for the classes.

[Question] Upon creating your training will the schoolchildren receive a solid speciality or just be close to one?

[Answer] In order to become a specialist, for example, in cybernetics the young people will have to study a great deal. But they will be coming close to their future specialty. For production it is important that in this stage we manage to arouse in the children a love for the occupations of engineer, designer and researcher, and select those who are capable, and then at the enterprise's expense send them to institutes and universities. These will be our specialists, our future.

[Question] And so there is a program of action in production itself, in training and in the personnel policy. But what about service for the consumers and the organization of service? The association's future depends largely on this.

[Answer] Service exerts a certain influence. We will never forget this. Undoubtedly, firm service is the best. In certain cities our plant has representatives for conducting warranty repair. But there is no possibility of changing over to firm service completely. Most likely it should be branch service, on the basis of cooperation of several radio enterprises. This is how firm Orbita stores are being created in many cities. They exist in Moscow, Leningrad, Riga and Nalchik. The firm stores make it possible to study the demand and accumulate reliable data about malfunctions. Shop consumer services, unfortunately, do not provide precise information and do not satisfy us with respect to the quality of the repair. One gets the impression that the consumer service masters have only one goal--to remove the tag from the warranty repair. The shop receives 30 rubles from the manufacturing plant for each repair job, and frequently they do not render any assistance to the consumer.

As proof I can give these facts. In places where our warranty service is in operation in an average of one out of 10 cases the consumer has to turn the equipment in for replacement. The rest of the equipment is repaired by the foremen, the consumers are given advice as to how to use the items, and the people do not have to come back to the shops again.

The negligence and indifference of consumer service workers causes not only material harm, but also causes moral harm to the authority of the domestic products. Therefore it seems to me that we must more rapidly develop firm service on the basis of related enterprises that manufacture equipment.

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ROLE OF SHOP IN INDUSTRIAL PROGRESS DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 65-69

[Article by P. A. Leven, chief of stamping shop: "The Shop--An Active Participant in the Process of Transformations"]

[Text] Usually when a shop is technically reequipped or the output is updated it is an objective of transformations that take place from outside. Somebody gives birth to ideas and goes through the process of making them real, and the shop's task is only to "introduce" them. This passive role that is assigned to it has a number of negative consequences. Let us assume that the Department for Automation and Mechanization of Production has submitted an innovation, the shop has taken responsibility for it, and whether it goes any further than that is up for grabs. For the shop the innovation is "someone else's." If it does not work, the shop is frequently not bothered by this.

At our enterprise we have taken a different approach to fulfilling the comprehensive program that was developed for automation of production. The shops were made active participants in the transformations. First and foremost, in the general program there are concrete sections for each shop. Second, for each area of flexible automated production a special design-technological bureau is created. This structure of organization of flexible production has been adopted for the enterprise. The head designer of all the systems is the general director, and then come the designers for the various areas: the GAP for stamping, galvanizing, plastics, control, printed plates and so forth. The design bureaus for the various areas are created with the rank of sections and are subordinate to the shop in questions of introducing means of automation. The head designer of the area, along with the shop chief is responsible for the introduction of the GAP. As a rule, the special design-technological bureau of the area is located in the shop with which it is working. But our head designer of the GAP and the shop chief are the same person, which brings the interests of the developers and production even closer together.

In order to introduce the GAP a comprehensive brigade has been created which includes engineers along with the workers. The form of wages is the brigade form for all workers and engineering and technical personnel except for the manager of the design area and his deputy. It is necessary to emphasize one

more important principle of automation of production: all work should proceed without detriment to the fulfillment of the production program. The shop has had no adjustments or revisions of the plan in any stage of the work for technical reequipment.

There is not much information about how the shop will be transformed. It is known that stamping production is one of the most difficult. There is a good deal of manual labor and the noise level from the presses is high. The stamp machine operators are mainly women and during the course of the shift they have had to move what amounts to a large amount of weight although each part in itself is not so heavy. It was possible for them to injure themselves on the sharp wires and edges. Therefore in spite of the fact that the wages for the basic workers were fairly high, there were always difficulties with personnel. It seemed that everything was done for the shop--benefits in housing, dormitories, children's institutions, but the shop held up production and it was not clear what could have brought it out of its slump under the existing conditions. Automation turned out to be the only solution to the problem. According to the plan it was to have been an automated shop, although there are still some of the parts which can be manufactured only on ordinary presses. But there are not many of them since 90 percent of the parts will be produced under conditions of automation.

Three areas have been adopted in automation: the production of large parts on the basis of two automated lines and automatic presses; a robotized complex for manufacturing medium-sized parts; and special and universal automated machines for stamping small parts.

In 1984-1985 the shop was reconstructed and equipped with noise-absorbing devices. New equipment was installed. The measures earmarked for technical aesthetics were carried out. An installation for industrial television and loudspeaker communications began to operate in the first building. A line was created for producing large parts on the basis of presses from the Barnaul press plant. It performed six operations, releasing five people from each shift. Now only one adjuster runs it.

The robot equipment section has also gone into operation. Here they have installed 32 presses which are run by 64 robots. In one section we encountered the same problems found with other productions that use robots: in our case their productivity was lower than that of the equipment they controlled. So far the robot equipment section cannot be called comprehensive since the control of the robots has not been transferred to a single computer. But in the future this will be a robot equipment complex and the second shift will operate completely without human beings. Everything necessary for it will be manufactured during the first shift.

So far the robot equipment section is producing mainly a social effect and the increase in labor productivity is not great, while on the automated lines for large parts based on the Barnaul presses it has increased five-fold. There is a large amount of work left to do. It is necessary to transfer the complex to control from an Elektronika-60 computer, to put a robotized warehouse into operation, and to improve the transportation devices. It is quite obvious to us that, difficult as it may be, we will have to change the mechanical part

ourselves. The developer organizations and the manufacturers of the technical equipment in this stage of the development of their brainchild prefer to place all the complexity of this work on the shoulders of the consumers.

The creation of flexible automated production has revealed a number of other problems which, it seems to me, will be of interest to others. The changeover of the parts to manufacture by the automated method has involved certain changes in their design. Now the shop makes 50 percent of its parts through automation and, as I have already said, it should be making 90 percent of them this way. Under an agreement with the special design bureau of the enterprise, the developer of the product, it is necessary to work on changing the design of certain items. This is one of the duties of the SKTB which is handling the automation of stamping.

The next important problem that is causing considerable difficulties is the servicing of the flexible production systems. The structure of production personnel is changing: the number of basic workers is decreasing and there is a sharp increase in the staffs of auxiliary workers and also engineering and technical personnel. It is necessary to revise the standard staff rosters. For usually a large number of auxiliary workers and engineering and technical personnel is almost regarded as sedition. Flexible automated systems should have different personnel structures.

Payment of service personnel is an important issue. A good deal relies on norm setting. Auxiliary workers, as a rule, are time-rate workers. We have tried to introduce a normed assignment. We obtained an effect and wages also increased. But still there is no 100-percent guarantee that the work has been normed correctly. Recently I was at the Riga Radiotekhnika. Here the welder repair workers have been changed over to piece-rate wages. The result both for them and for production seems to be fairly good. All the norm setting at Radiotekhnika is centralized, but for this section they assigned a norm setter since such great significance is attached to norm setting in the repair service. Apparently, at least for the time being, we shall also follow this path until we are ready to change the section over to the collective form of organization and payment for labor.

Now when automation is in the process of completion, there is the extremely crucial problem of brigade organization of labor for servicing the GAP's. The fact is that in addition to intrabrigade situations, its functioning is also influenced by shop situations. At the enterprise there is a high rate of change of the items. Flexible productions make it possible to adjust the equipment for the products more rapidly. But all problems of operational-calendar planning must be solved in order for the brigades to be loaded uniformly.

Of course there are many problems and difficulties ahead of us. But even that which has already been done makes it possible to hope for success. More than 100 people have been released. The shop is operating uniformly and it no longer keeps its shift workers overtime. There is confidence that in the future it will be able to provide for stable production.

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FUNCTION OF BRIGADE IN FLEXIBLE PRODUCTION DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 69-73

[Article by N. A. Markina, foreman-brigade leader: "The Brigade in Flexible Production"]

[Text] In order to work in modern automated production one needs certain qualities, knowledge and abilities which are different from the requirements which were previously necessary when performing operations on a conveyor or at individual tools and machines. Of course conscientiousness, responsibility and the ability to work will always be important. These qualities are universal in any work, regardless of how the person may be employed. Yet flexible production systems controlled by computers set new tasks for the worker. It is necessary to have a certain amount of knowledge of computer equipment and programming and one must have a good memory and speed in reacting to the signals from the computer.

Our section has been working under conditions of automation for 5 years now. Older workers have come to us, but they have been oppressed by the need to react rapidly to the coded information and make immediate decisions. They have lost their heads and become confused, and they have made mistakes, although they demonstrate many of the qualities that are important for production better than other people, for example, endurance and the ability to work. But youth have rapidly met the new requirements set by flexible automated production, and they have been prepared for it by the program in teh secondary school or training in vocational and technical schools.

Of course other problems arise when the collective is made up of youth. The girls get married, interruptions in work begin because of maternity leave, and they feel to work their shift because a child is ill. But the children grow up, everything returns to normal, and those professional qualities which the worker had are gradually restored.

In order to ensure the effectiveness of automation of production and remove the influence of the personnel problem, we have considered it necessary after assimilating new technology on the line for printing Trassa plates to change over to the brigade form of organization of labor with payment according to the final result. And in 1981 we began to work individually with time rate

payment. During the period of assimilation of a new technology, it was impossible to arrange the work differently since not only the operators, but also the adjusters and repair workers were not familiar enough with the equipment.

Our section for automatic assembly of the plates is equipped with machine tools with numerical program control which are hooked up to an SOU-1 computer. Automatically, according to a program the machine tools print radio elements of the same type and glue them onto plates. In order to change the products all one need do is change the program. Because of this there has been a considerable increase in the flexibility and mobility of production. Trasa has made it possible to eliminate manual operations in printing plates, cutting and shaping. The product quality has improved since the work according to the program under automatic conditions has eliminated a fairly typical mistake when the operations are performed by hand--confusing the control points.

As a result of this 72 people have been released in the shop and product quality has improved. In flexible production systems engineering and working personnel come much closer together. The engineer draws up the program and the operator puts it to work. The effectiveness of the utilization of a flexible system depends largely on the engineer. He can write the program in such a way that when it is replaced there is no need to remove the machine tool or stop it. If everything is taken into account the replacement can be done during operation. We have included engineers in the brigades and made their earnings depending on the final result of the work. Now they try to prepare the introduction of new programs in such a way that there is no unproductive or idle time of equipment. If they have free time and one of the operators is absent, they can run the machine tools.

The brigade also includes batchers, someone to distribute the work, and operators to monitor the plates. Thus all the personnel in the section headed by the foreman-brigade leader have formed a unified complex. Because of the changeover to the brigade form of work, the collective's self-organization has increased. Replacing one another and combining jobs are practiced extensively. Thus we have eliminated three operators in checking the plates, and now the monitoring functions are carried out by the machine tool operator. Manual monitoring is monotonous and unprestigious work. Previously in the section there were difficulties selecting operators for monitoring. Now the collective is interested in reducing the number of personnel since 50 percent of the savings on the wage fund goes as additional payment for combining occupations and replacing absent workers.

We have a unified wage fund which is planned according to the normative per unit of product output and unified conditions for material incentives.

The main indicators for awarding bonuses are the following.

Fulfillment of the plan according to the products list, fulfillment of the plan for labor productivity, and the level of delivery with the first presentation.

When calculating the brigade bonus, in addition to the basic indicators I mentioned, the amount is affected by two coefficients: K_1 —failure to fulfill the shift-daily assignment, which does not involve down time of equipment of other sections; K_2 —if other sections have been idle by the fault of the Trassa line. The first coefficient reduces the bonus by 0.025 percent for each instance, and the second—by 0.05 percent. But this is under the condition that the monthly plan for the products list as a whole is fulfilled. If the assignment for the products list has not been fulfilled, the collective of the brigade loses all of its bonus.

The level of the bonus of an individual worker is affected by the individual coefficient of labor participation. A quality chart is kept for each operator. If the KIU is equal to 1, the maximum amount of the bonus is 40 percent of the average earnings.

Previously the incentives for engineers of the section depended on the overall indicators of the shop. Now their bonuses depend directly on the final result of the section. They have a chance to receive a bonus of up to 40 percent of their salary.

The section now prints up to 50 percent of the installed radio elements onto plates. In time we will include up to 85 percent of the elements. To do this a whole series of problems will have to be solved by us, by the designers and by the brigades that run the section for mechanics and electrical equipment. They also depend on the results of the work of the section. The allowable down time for technical malfunctions is 0.25. We have already managed to reduce this to 0.2, and in the future it will be 0.15. The service brigades are working with us to obtain this result.

Brigade organization has made it possible to considerably increase labor productivity and increase the return from flexible production. A machine tool prints on plates 35,000 radial elements per shift. The worker used to print 5,000 element by hand. And after her others did the cutting and shaping. During the first year of work with the machine tools the output was 7.5 million elements per machine, and in 1985, after the changeover to brigade organization of labor, it increased to 15 million (in addition to the improvement in labor organization, of course, the higher level of skills and the mastery of new technologies had an effect on this). The average earnings of an operator increased from 160 rubles per month during the period of individual work to 200 rubles per month.

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BERDSK WORKERS PROVE SUPERIOR

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 72-75

[Article by T. P. Khoroshilova, deputy director of the Orbita store (Novosibirsk): "Comparison—In Favor of the Berdsk Workers"]

[Text] Orbita is the largest store in Novosibirsk that specializes in household radio equipment. We receive products from all the leading domestic enterprises that produce these items and we can compare the demand for them. For the majority of kinds of products the comparison is in favor of the Berdsk workers.

Of the stereophonic record players there is a great demand for record players of the highest class, Arktur-006, of the first class, Vega-109 and Vega-120, and also the transistor radio of the third class, the models Vega-340, 341 and 342. The Vega-300 radio tape recorder that came out recently is selling especially rapidly. The external appearance of the product has become more attractive, the weight and size have decreased, and the acoustic characteristics have improved. But the model of the second class, the Vega-206, did not sell, although it is not much more expensive than the model of the third class and it is considerably less expensive than the first class, but the consumers are not satisfied with its external appearance and sound.

In terms of their technical level the closest ones to the Berdsk equipment are the items from the Riga Radiotekhnika, although in our city there is a moderate demand for them because there is a somewhat larger number of returns. Apparently this is also affected by the circumstance that the Berdsk Radio Plant has its own firm network for warranty service in Novosibirsk. This enables it to organize service better. For sometimes a minor complaint ends up to be a problem if the warranty shops of the consumer service administration make the clients waste time in lines and do not pay attention to their remarks, which happens fairly frequently.

Of the portable stereo radio tape recorders (a tape recorder with a radio) the Vega-328 is in greatest demand, although its price is almost the same as the items of the second class. Tom-206 (420 and 450 rubles). Moreover it is practically the same price as the radio tape recorder of the first class Kazakhstan which, like the Tom-206, costs 450 rubles. The Kazakhstan is a

fairly good model and the price is not high for equipment of the first class, but the weight and size characteristics should be improved. The weight of this radio tape recorder is 10 kilograms which, of course, is too much for portable equipment. The Vega-328 weighs 5 kilograms, but this is not the limit.

Recently stereophonic music centers (radio, turntable and tape recorder) have become more and more popular. They perform several functions and at the same time the sets do not take up much space in the apartment. Here clear preference is given to the Vega-119 and the Riga Melodiya-101.

An extremely remarkable circumstance is that recently the Berdsk workers have accelerated the replacement of models. Of course when a new model appears at the same price, people stop buying the old one. But when the market is saturated with radio equipment, this is the only possibility of maintaining interest in the products of their enterprise.

The combined exhibit-sales which we conduct with the Berdsk workers make it possible to determine the tendencies of the demand. As soon as it becomes clear that the consumer's interest in one model or another has dampened, it is immediately removed from production. This is what happened with the Vega-206 record player when the demand for it disappeared.

The popularity of the Berdsk equipment can be confirmed with these figures. Of the items sold in two sections during 1985, 29.2 percent were products from the Berdsk Radio Plant.

Of course there are individual complaints against the Berdsk products. Mainly about reliability. Against the overall background of the complaints (concerning color television sets during the period of presale preparation, for example, a large number of items were rejected) the statistics of breakdowns of Berdsk equipment are not great, but it does happen. Some proportion of the returns come during the warranty period. Regardless of how small this proportion may be, it causes a bad attitude among the consumers. Therefore the task of increasing reliability remains crucial as before.

In order to reduce the number of returns and complaints, the Berdsk workers, in addition to other measures taken during the process of production, have sent two highly skilled radio repairmen to the store to presale preparations. I hope that improving the quality and raising the technical level of the items as well as concern for their reliability will contribute to increasing the popularity of the plant trademark.

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NEW DIRECTOR'S STYLE EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 74-90

[Article by Valentina Krasnova, journalist: "Hurry Up So As Not To Be Late"]

[Text] The First Decisions

The old-timers did not accept him. The new director decided to break the resistance of the old timers.

Everyone at the plant who had worked there since the first day considered themselves old-timers. They stuck together strongly. They were respectful of their merits. They had a complete, well-earned right to this. The new director understood them, but he did not have time to make contact with each person individually and look in on the microcollectives. He decided that he would speak frankly with everyone all at once. He called to a conference all the first deputies, head specialists, shop chiefs and foremen—in a word, the people whose silent disapproval of his presence at the plant he had been feeling for several weeks now.

The director was young: 38 years old. Many old-timers were the same age, but...they had built this plant.

Like many industrial enterprises beyond the Urals the Berdsk Radio Plant was created during the first year after the war. The old-timers remember this time well. The first winter was especially difficult. The whistle broke the silence of the small town in the mornings. People thronged through the snowy, narrow streets to the plant. In soldiers' overcoats and boots. There were no radio operators among them. The most necessary and, consequently, the most fashionable was the carpenter's occupation. There was not even an instrument section at that time. They repaired their own saws, axes, hammers, and spades which they had brought from home. The workers were not bothered by the special footwear with the wooden sole. They were not above hitching themselves to a sled and hauling slag from the railroad station to insulate the roof of the future shop.

A gift of unheard-of generosity for them, who had been working in the poorly lit former warehouse heated by bonfires, were 2 dozen (for the entire plant!) electric light bulbs.

Many of them walked across half of Europe before the victory and now with impassioned stubbornness, they were trying to reach a new goal: to learn to make radios. The first assemblers mastered the profession empirically, they took apart and put back together an old 7-9-27 radio which had come to them by some miracle. They looked at it, remade it, adjusted it--until it spoke.... From the three-digit figure on the slogan: "We shall give the homeland the first 100 radios!" they took their inspiration at that time. When they had set their first labor record, they named their first radio after it--"Rekord"....

In general the past made the old-timers confident and strong allies. But the new director? He was already the seventh.... Would he last long? He began, like his predecessors, with reorganization--but not of trivia. He decided to introduce the economic reform. He announced: The plant will now obtain a profit from each Rekord that is sold, and not released to the warehouse....

"The more Rekords we sell," explain the new director, "the larger the sum of deductions. Naturally, nobody will purchase bad products."

"And we will not trade in them?"

"What was wrong with our old system? We managed...."

The old-timers started whispering.

"The old system," the director broke in sharply, "was good. You filled the warehouses with products--there was nothing to worry about. But now there is something to worry about: both quality and productivity. Anybody who does not like it can turn in their resignation. I will not keep you by force."

There were more than enough difficulties. The plan "did not go." There were no bonuses. There was nothing with which to build housing.

"Were you not a bit harsh with the old-timers? What would you do now? The stakes can be seen more clearly 20 years later."

Aleksandr Nikolayevich Shkulov smoothed down his gray hair and answered: "I did the right thing. The only ones who left were the ones who did not want to work hard, for whom their plant position was a sinecure...."

The next morning the director signed two resignations "at their own request." And in the evening there was a party meeting. He spoke. And unexpectedly right from the podium he addressed specific people.

"Why do you run like a rat from a sinking ship? This is your plant! What is it that you personally do not like? Yes, yes you, a specialist in labor and wages."

"At the other plant they promise an apartment and higher wages...."

"Legitimate complaints. But I am not a joker. I ask you to wait. All of that will come. You are a good specialist. We need intelligent workers now no less than radio operators. We must not throw away our personnel."

Recalling his beginning, the director says: "The manager begins with the first decision he makes." And after a long pause he added, "If he is able to organize its implementation."

The first decisions of the seventh director were directed toward reconstruction of the style of management at all levels. He introduced the development of production schedules at conferences of managers of shops, departments, services and head specialists. The decisions were more efficient and it was easier to check on their fulfillment.

On the director's instructions they developed planning and analytical documentation which determines the interrelations among shops, departments and services of the plant. A summary document appeared--a sheet of paper consisting of squares filled in with figures and connections among them. The initiated can look at it and see immediately how things stand in each shop and in the plant as a whole, and who is holding up production.

The new system of interconnections in the management of the enterprise revealed all the sore spots and made clear the worthlessness of certain managers. At this time "at their own request" a couple of more foremen and even shop chiefs left.

One of the most troublesome shops was the one that made the housing for the radios. Just yesterday it was an independent little furniture factory that specialized in buffets and tables painted with oil paint to look like oak. The technology for lacquering the sides of the Rekord turned out to be more difficult and the former director of the factory, who had been demoted to the rank of shop chief, was offended and was in no hurry to learn the new technology. There were no people who knew the trade of wood painters at the plant. And the director himself began to learn the fine points of radio housing production.

He began and ended every day in this shop. The calculations of the economists, the peculiarities of the paints that were used, the difficult labor of polishing--all these interested him. Within a month he fired the former furniture plant director from the position of shop chief. He appointed his own from the plant and began to tell him how the shop would look in the future: with a flow-line cycle using the latest equipment....

Even after 2 years the economic reform made the plant earn millions. The material incentive fund and the funds for social and cultural measures and housing construction and the development of production in 1968 amounted to 2.5 million rubles. More than a million were paid to workers in the form of bonuses and other forms of incentive.

On the basis of deductions into the fund for the development of production, they began industrial construction, expansion and updating of the shops, which has not ceased to this very day.

The laborer who believed in the plans of the new director soon received his new apartment. He became one of the leading specialists of the labor division.

"Everyone understands," he says, "that both wages increased for everyone and housing became better because the plant began to operate well.... The only thing I do not understand is how the director could see in me, an unnoticeable shop engineer at that time, a future specialist?..."

"I Order You To Introduce Culture..."

A direct consequence of the economic reform of 1965 was new rules for labor organization.

Nobody will eliminate the production plan or, consequently, the quantitative indicators, but the center of gravity is shifting to quality. Rekords must be sold, because only then will there be profit. Quality ensues from the culture of labor. Now they have begun to take this indicator into account when summing up the results of the competition.

At first Shkulov demanded only cleanliness, order in the workplaces and labor discipline. Then, when the plant began to make millions, the requirements became stricter and they began to talk about the overall culture of production. With the years the culture of production became a more and more concrete concept and its content was sometimes enriched with the most unexpected nuances. The millionaire plant began to expand and update the production base, construct new buildings, and purchase costly equipment. In order to carry out the large amount of construction work without worrying about irregularity of deliveries, the director organized their own brick shop which for some reason was immediately christened the "brick plant." They had guessed that in time its capacities would be as great as those of independent brick plants.

They began to repair the plants. During the night they managed to paint the floor on an area of several hundred square meters, and along the machine tools they painted a multicolored strip to look like a carpet runner. Another time during the night they repainted the walls--and in the morning the workers had to go back and count the floors: they didn't know whether they had ended up in their own shop. The broad stairwells were lighted not with long pale neon "pipes," but with a warm, soft radiance from slide projections on which were depicted an apple with drops of dew, Siberian crocuses, and a sunny forest meadow.

The culture of production did not end here with concern for external gloss, the attitude toward it was much more serious.

A complaint came in from Shop No 5. The air conditioning was working poorly. The director asked the shop chief to straighten it out. During his next visit he was interested in how the air conditioning was working.

"That is not my business," declared the shop chief, elated by his successes: the plan had been overfulfilled and they were expecting awards and bonuses. "There is a special laboratory and it can check on the air here...."

The next day an order was signed to remove the shop chief from his position. The director himself commented on this at a conference of the trade union aktiv.

"Our production affairs will not improve unless we improve the moral and psychological climate of the collective and first of all working conditions. Make greater demands on your subordinates and develop in yourself an attentive attitude toward their needs...."

As a theater begins with a cloakroom, so a plant begins with the director's reception room.

The secretary's desk in the reception room of the director of the Berdsk Radio Plant is not piled with papers; there is only a small notepad and a selection of various colored pencils there. And next to it is a panel half the size of a desk.

There is never a crowd in the reception room (with the exception of those cases when a couple of minutes are left before the beginning of the conference). And several years ago long lines formed here. From day to day the number of people waiting to be seen increased.

An entire army--about 200 engineering and technical personnel--came in each day, waited, coordinated their ideas and signed plant papers. Almost 100 more people came in and waited in order to resolve immediate personal affairs. Almost 200 of yesterday's sick people moved through the plant with blue sheets of bulletins. Every day several hundred people thus walked back and forth across the plant territory.

And then the director gave orders to introduce a circular postal service so that everyone who "willingly or not become accustomed to idleness would switch to productive labor"--that is how he expressed it.

The principle of the circular postal service is known; all papers "flow together" into a single center where the sorters register them, determine the route and check to make sure that the paper is not lost and does not "grow a beard" en route. All expenditures on its organization, including purchasing 111 files, the wages for the sorters and the driver of the necessary motor vehicle, would be recouped, as it was written in the official document, in 0.13 years.

But still culture cannot be inculcated into production through the voluntary efforts of one person and the "instructional" orders of the director. Shkulov understood: It is necessary for as many specialists as possible to become his

allies and assistants. And therefore at the plant they began economic and technical general education. The director himself studied, never being afraid to show, that he did not know something and always trying to reach the essence of the problem. both youth and managers of all ranks who were no longer young studied, mainly those who were not able to obtain a general education at the usual time of life. Theoretical knowledge expanded the horizons of the practical workers and was interpreted from the standpoint of plant needs—and this helped to broaden the horizons of the enterprise. Machine tools with numerical program control appeared in the shops. The specialists began to work with computers. The plant opened up its own computer center.

Products of the Berdsk Plant, which were initially intended for Siberian and mainly rural consumers, became popular throughout the country. Such was the natural result of consistent introduction of the elements of culture into production. The Rekords began to travel to international exhibitions. Letters of gratitude began coming to the plant workers from Soviet and foreign consumers.

And not so much time has passed since Aleksandr Nikolayevich Shkulov became the director of the Berdsk Plant. Only 8 years. But the enterprise has become unrecognizable. The successes have surprised people, inspired hope and elated them. The plant was getting ready to take off.

And suddenly the director had a heart attack....

People at the plant like to recall not Shkulov's illness, and not his temporary successor, nor even Shkulov's return. It was as though he had never left the plant. And on the first day he worked after his return he did not utter any emotional phrases. In the evening he gathered together all of his "generals"—chiefs of shops, services and divisions.

"Hello. It is late and there is a lot to do. Let us give reports without any extra talk. The first shop, I am listening...."

From the Rekord to the Vega

"There goes our director. Tall, gray."

"Does he visit the shops frequently?"

"If something new is being introduced."

"Have you had occasion to speak with him?"

"I—no. But Petrovna knows him. She has been working at the plant since the first day and knows all of the directors."

"Yes, there have been several in my time. And this is the seventh. Under him they began to build and they have not stopped to this very day. The buildings where we now work were not there before either."

"You, Petrovna, tell us about another thing: How he fired you...."

"What nonsense: He never fired me. New machine tools had been delivered to the section. And they came with robots. They inserted the blanks themselves and they took out the prepared parts themselves. Well, the other stamping machine operators and I became superfluous. They gave us other work--planting flowers, but the earnings were less there. I went to the director. He did not even let me finish what I had to say. 'I understand everything,' he said, 'but we give wages according to the labor. And you have no skills.' He was very sharp."

"What are you dissatisfied with, Petrovna? He then gave a command and they found work for you and the electrical section in our first shop. And you now have fairly good wages."

"But I am greedy for work!"

There are as many opinions as there are people. Especially about the director. He is always in view. For a decision which enters a new line into the development of the plant's scientific and technical base can have a bad effect on the self-esteem and even on the material position of the people today. This is what happened to Petrovna. Later she herself admitted that it was mainly her labor pride that had been insulted: from a stamp machine operator she suddenly became a flower tender....

And at the same time: "The plant is primarily people"--this is how he formulated the conclusion from one of his sometimes unexpected lessons which life taught him. Soon after his return to the plant Shkulov declared an emergency. The collective must immediately change over to producing stereophonic equipment and it must absolutely have its own design.

One cannot say that the new undertaking was approved by everyone immediately. They wanted to rest a little. The products were of high quality. They were easily sold. The deductions and wages--the highest in the branch--were increasing correspondingly. They were building residential buildings, production facilities, kindergartens and stores....

The names of the new equipment were selected in honor of the brightest stars in the northern sky--Vega and Arktur. They created a plant design bureau in order to develop their own models.

Days for the SKB [Special Design Bureau] were measured not in hours, but by the amount that has been done. The task was difficult in and of itself, but here the director was also delving into all the details. It was very difficult to work with him. He understand everything and therefore was the first to notice mistakes. He scolded. He helped. He supported the designers with confidence when they had thrown up their hands. Just as at the very beginning of his job as a director he "lived" in the radio housing shop, now at any time of the day or night he might appear in the SKB. And he demanded that they accelerate and accelerate the rates. Certain designers could not stand the tension and left. Certain others then returned from easy earnings to difficult creative labor which required fantastic devotion and complete exertion of efforts.

And then in May of 1972 the experimental model of the first stereophonic Rekord player, the Vega-101, was sent to the interrepublic wholesale trade fair in Moscow. Designers from Riga came to see it. "An excellent machine! Can the Siberians really assimilate its output?

The Riga workers had been producing similar equipment for several years and understood how difficult it is to arrange for series production. The Riga workers had excellent domestic and foreign equipment, well-arranged technology and skilled personnel. They knew that there was nothing of the kind at that time in Berdsk.

And then after the output of the 15 millionth tube Rekord the plant changed over to producing only stereophonic equipment.

The director made a responsible decision--to attract youth for the assimilation of the new products. To many production workers this decision seemed risky. But the Berdsk Radio Plant has its own traditions and its own logic about working with youth. The director believes in the germ of talent in each person and thinks that it is necessary to notice it as early as possible and create suitable conditions for the development of capabilities. Therefore on the basis of the plant he organized a school for new radio technicians, constructed special premises for it, and enlisted skilled specialists in radio technologies for teachers--and the children who appear in the school have special capabilities and will be sent from the plant to an institute for training. Therefore Shkulov is never afraid of entrusting responsible jobs to youth and placing them in high posts. Has he ever made a mistake in this? Of course. One of the people he promoted to the position of chief of the department of automation and mechanization ended his career as a fitter. And another one who came to him immediately after being placed with the declaration "In the future I see myself as director" became an eminent figure in the plant. The director says that the "marshal's baton" which this former young specialists keeps in his knapsack might suit him.

It is worthwhile recalling the history of the creation of the first youth section at the plant. Many plant managers were experiencing how crucial the problem of "adolescence and the conveyor" was. It is at the conveyor that they place adolescents who do not have any skills yet. But the working day is reduced for minors. And if even one person leaves the rhythm of the conveyor is upset.... The director suggested creating a youth section at the conveyor which after a certain amount of time necessary for forming the "backbone" of the collective, begin to work successfully.

Then another one was created. In order to produce the first Vega transistor radio it was necessary to create a new shop and recruit several hundred people for it. Higher skills were required here than in other shops and also a higher culture of production. The creme de la creme could have come here....

"But we did it differently," said the director. "The experienced ones had to be retrained and they had to master the new technology. But we will teach youth. In the highest class at once!"

Throughout the quarter the young people (average age--19 years, education--secondary) learned to assemble, install and regulate transistor radios. And within less than a half-year they began to produce 15,000 Vegas a month.

Now a good deal is being said and written about the brigade method of labor organization. At the Berdsk Plant it was first tested in those youth collectives. A little later they began to apply it not only for workers, but also for technologists and designers.

"That is the only way," the director summed up, "we were able to carry out our tasks. Everyone felt that he was responsible for the general success. And the young people were no exception."

And there is nothing surprising in the fact that at the Berdsk Radio Plant there is now no justification to complain about the lack of initiative of youth. When they began to talk about mastering the production of the new Vega-328 stereo tape recorder at the plant, the Komsomol delegation came to the director: "Let us make the 328 with the hands of the young people!" The job was urgent. The motto of the director: Trust but check. Therefore one early morning he came to the shop and there a fellow...was sleeping. He explained: "I cannot sleep at home. Something might happen at the shop all of a sudden, and here I am close at hand...."

Recalling this episode later when the Vega 328 had already successfully undergone all the tests, the director sadly noted: "And there are so many more of these young specialists whom we overlook in our haste and feverish activity. It is a shame...."

The Future Begins Today

Today the Berdsk Plant produces 16 percent of all the household radio equipment produced in our country and has become the leading enterprise in its branch. Products with the trademark BRZ are sent to more than 3,000 destinations in 13 states: Poland and Australia, Mongolia and France, Cuba and England.... The Vega transistor radio, whose production was mastered by the Komsomol youth shop, has been at trade fairs and exhibits in 13 countries. The stereo equipment has also won recognition. High ratings are also given to the Vega-101 record player whose series output, in spite of the doubts of people in the know, was assimilated at the Siberian plant. "The quality of the Vega-101 model is superior," wrote the technical director of the English firm ARIFTO, N. Boens. "I am happy to congratulate the designers and manufacturers...." Just during the first year after the beginning of series production, England purchased 11,600 of these electric record players.

The super receiver-tuners and the compact "music centers," the transistor radios, the radio tape recorders, tape recorders and electric record players. The range of products is wide; true to its tradition the Berdsk Plant is offering radio equipment "for everyone": for the music experts and for the no less exacting consumers, and for those who need an inexpensive but good item.

In the history of the plant's development one can trace a chain of patterns which show that the attraction to the new is not at all a passing fashion

here. This enterprise has its permanent, clear "signature" in work with technical ideas.

In all of the shops they are constantly updating technical equipment and technology. Large changes have taken place, for example, in the oldest shop--the casting shop. About 2 years ago the sawing section was considered the most difficult here. One after another the workers who used files to remove by hand those ragged edges, bumps and barbs from the prepared cast piece retired on pension. And the youth were not interested in this monotonous work. It was necessary to call on technical progress for assistance immediately. Now the shop has an installation which removes the barbs...by explosion. It was developed in the special design bureau for hydraulic impulse equipment of the Siberian branch of the USSR Academy of Sciences.

The Berdsk Plant has longstanding ties with the Institute of Inorganic Chemistry of the Siberian Branch of the USSR Academy of Sciences and other academic and branch institutes as well. The list of tasks that are now being carried out at the plant with the help of scientists would take more than one page, and about 50 agreements have been concluded for cooperation.

The alliance with sciences established long ago, during those years when the specialists of the Berdsk Plant, having assembled their first Rekord from blueprints which had been delivered along with batching items from one enterprise near Moscow, wanted to create their own radio with a better design. And then, going to many scientific research institutes and design bureaus for consultation and assistance, they got the idea that it is necessary to create their own base for creative research because many ideas generated in scientific research institutes still must be adapted to the concrete production or, as the production workers themselves say, they must be "made into a process." It was necessary to have a brain center which would be in charge of the work for introducing scientific ideas and searching for independent solutions and which could build bridges between science and practice.

Initially this role was played by the head designer's department (and 10 years after the output of the first Rekord the model of the Baykal radio tape recorder developed in this department received the silver medal at the World Exhibition in Brussels). Later the mission was assigned to the plant designers bureau which created stereo equipment. A laboratory for new technological processes, in which about 20 specialists work, appeared in the head technologists' department.

It is very important that when establishing contacts with scientific institutions the production workers did not try to "grab" individual innovations which are needed today. They familiarized the scientists with the tasks which the plant would have to carry out in the next five-year plan and even the more distant future.

Today's radio equipment is not simply constructed. For example, the internal structure of the Vega-328 stereo tape recorder, as specialists state, is much more complicated than the internal structure of the motor of a passenger car (for instance, the Zhiguli). All the significant parts are joined together by

wires with solder. Solder is the Achilles' heel of the production, a method that is unreliable in principle. Reliability increases sharply with film technology, when a wireless joint is traced in paste and burned onto a ceramic base. The search for a more technology means of burning led to the Institute of Nuclear Physics of the Siberian Branch of the USSR Academy of Sciences. Preliminary tests show that the speed of burning can be reduced from several hours to a couple of seconds. In order to introduce a new technology into production, it will be necessary to do a good deal of restructuring—from new equipment to new buildings. Again the firm hand of the director was required to direct all this large amount of work for updating the enterprise which did not cease for a day.

Among the archive documents of the plant's museum there is an old-fashioned paper file with gray binding. It includes entries from the first commercial director, who worked with all the directors. He gives a curious description of the managers. The style of management in his view is greatly intermixed with the character of the person.

"...The seventh director," he wrote, "is tenacious, attentive, stubborn, he does not think about time. He is a very persistent worker. At a conference with designers he is capable of proving the groundlessness of their solutions. He expresses concern for workers by constructing housing, hospitals and dispensaries... There is no obstacle for him which would keep him from fulfilling the program. He is very concerned about production and firmly supports state interests and firmly maintains state positions...but he: At first he did not "consolidate" the collective, that is, he did not organize mass functions and did not attach any importance to that. Second, sometimes he does not weigh what is included in the plan from above with the capabilities of the plant. Recently many have been overexerting themselves, which is reflected in the people's moods. They stay at the plant almost for days. The rhythm and tension must be weighed against the interests of the workers. But he wins them over...he always consults with the collective when making decisions...."

These impressions are almost 20 years old.

Today the business and personal qualities of the managers of all levels at the BRZ are evaluated according to the results of anonymous questionnaires. In these questionnaires the opinions about the managers are sometimes expressed sharply and categorically, the evaluations are very mobile, and they can change depending on the situation. But for several years now according to the results of the questionnaires, Shkulov has been receiving the highest number of points. This, of course, does not mean that his subordinates find no shortcomings in him. Many dislike the fact that the director does not like to give praise. He can be abrupt. And even harsh. Because of a conflict with the director an irreplaceable head designer submitted his resignation "at his own request" twice. But the director would not let him go either time.

The head designer: "Creativity means the tortures of hell. Only one or perhaps two out of every 10 people who come to us for design work are really suited for it. Three years after the VUZ he was still studying, and then, not until after 5 years does he try to stand on his own two feet. And you send

him to me...as a supervisor. One must not destroy a designer! This is wasting minds!..."

Director: "Did you receive an order? Then carry it out! Whose ideas will the new manager be embodying? Yours! And you taught him to understand the meaning of design work. This means that everything is in order...."

This conflict has been going on for almost 2 decades.

This is probably why the director, in spite of the fact that he receives the highest number of points, still checks all of his intentions and deeds against the highest goal. And he formulated this goal immediately after he arrived: "Here it is necessary to create a really modern plant."

"A really modern plant," explained Shkulov, "is one in which nobody has either to catch up or overtake. We must produce products so that others catch up with us."

"And it makes no difference to me," he said quite recently, "what the plant is like after I leave."

One more responsible decision was adopted recently: to prepare for changing over to technology that does not involve human beings. All the heavy and monotonous operations will be performed by machine. An automation program has been developed. An order has already been signed to transform the Berdsk Radio Plant into the base enterprise for introducing flexible automated productions into the branch.

Automation here is not a goal in itself. The plant cannot do without it. Especially now when they have begun to assimilate the output of radios with microcircuits and have begun to develop record players in which the traditional needle will be replaced by a laser beam--the beam will "read" sound information.

Aleksandr Nikolayevich Shkulov has been put in charge of managing the introduction of GAP and he is the head designer of the new record player.

What will the plant be like? What will have to be done for it and what is already being done? These are subjects for separate discussion. Now I should like to find an answer to only one question: "What causes the director of the Berdsk Radio Plant always to get into the thick of problems? And how must one see the world in order to be able to dream at that age?..."

Aleksandr Nikolayevich Shkulov refused to answer this question. And perhaps he does not have an answer.

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STORE DIRECTOR QUESTIONED ABOUT DEMAND

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 76-79

[Interview with M. G. Kiseleva, director of the Orbita Firm Store: "The Persistent Demand of the Consumer"]

[Text] [Question] Your firm store represents the branch. How is it different from the trade organizations of the USSR Ministry of Trade and what additional tasks and functions does it perform?

[Answer] Modern radio equipment is among the most complicated items of household equipment. Everyone understands that this is not a trinket that one simply places in the hands of the consumer when he pays the bill. It is necessary to consult, to help to select the appropriate model, and to check it along with the consumer so that the technical equipment is in good repair and even to teach the consumer to utilize the equipment correctly. It is no accident that here a large proportion of the radio and television equipment is sold in specialized stores. And specializes stores of the manufacturing branches also perform important functions for studying demand, advertising and providing information about the latest achievements in the development of complicated household equipment, and gathering statistical data and information for institutes and technical services of the branch and manufacturing plants concerning the level of reliability and the technical specifications of the items that are being sold.

Our ministry has more than 10 of these stores in various regions of the country. They have solid engineering services headed by a deputy director for technical equipment or a head engineer. And there is an engineering group in each section qualified to work with consumers in their specialty (radio equipment, television equipment, and so forth). One of the major tasks of the service is 100 percent checking of items that come in for sale using the latest technical equipment for control and measurement. Having a large base of statistical data, it can seriously raise before industry the question of eliminating any defects revealed. Therefore it is quite predictable that the firm stores of the branches have long had the right to place the "blue stripe" on items, that is, to draw up documents (they are filled out on special blank forms with a blue stripe) on the basis of which decisions are made concerning halting the production of one kind of product or another.

[Question] Do you frequently have occasion to use the "blue stripe" on items from the Berdsk Radio Plant?

[Answer] I would say that the Berdsk Radio Plant appears least frequently among those businesses for whose products these documents are drawn up. The collective is mobile and it reacts sensitively to demand, which is extremely important now since the demand for radio equipment has stabilized in recent years. Its level can be maintained and increased only by constantly offering innovations and improving the nature of the items. The Berdsk workers are sensitive to these tendencies and respond to them correctly. We have mainly stereophonic equipment from this plant. There is now a large demand for components. A music center is created out of individual components. If one of these malfunctions, it is removed and repaired. If desired, it can even be replaced with a new one. The Berdsk Radio Plant designed the Vega-120 music center according to this principle.

I have been familiar with products of the Berdsk workers for more than 20 years. I even recall the Rekord third-class tube radios which they produced. Even then the Riga Radiotekhnika was the leader in the branch. Berdsk dared to throw down the gantlet to the Riga workers and was worthy of competing with them. A strong design base was created there, because of which the Berdsk Radio Plant has the opportunity to update its models rapidly. Berdsk radio equipment travels to us over 3,500 kilometers on the railroad--shaking, loading, transshipping--and nonetheless with respect to reliability it is on the highest level among domestic equipment. We take from this enterprise all the products that are planned according to the funds while we do not accept items from certain other firms, taking advantage of the right we have been granted to refuse unmarketable goods up to 45 days before the delivery date.

In recent years there has been a considerable rise in the standard of living and the people's cultural demands have increased. The customer comes to us with extremely high requirements. A true music lover will not let the price of equipment bother him if only it has good acoustics and a pure sound. In Berdsk they work hard on these characteristics of the items. If you hear a record played on a Vega music center you get the impression that you are in a concert hall, the music sounds so pure and beautiful.

Berdsk equipment has a good appearance. And design plays an important role now. Equipment can have excellent specifications but if it does not look attractive people will not buy it and will give preference to equipment that is more elegant.

But there are certain complaints against the Berdsk items. Thus when analyzing and generalizing remarks for 1985 we drew attention to the fact that the consumers notice certain inconveniences in operating the Vega-119 music center because of the tape advancing device. We know that the Berdsk workers receive this mechanism as a batching item and even purchase it abroad, and we know of the difficulties associated with it, but the consumer does not know all this and should not have to know. Therefore we have considered it necessary once again to draw the plant's attention to this problem. And in general it seems to me that for such firms as the Berdsk Radio Plant or the

Riga Radiotekhnika it is necessary to deliver the very best there is in the element base and the batching items, and then they will be able to represent our radio industry in a worthy way.

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PRODUCTION INTENSIFICATION, LABOR PRODUCTIVITY DISCUSSED

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[Article by G. A. Klementov, Candidate of Economic Sciences, Higher Trade Union School of Culture (Leningrad) under the rubric "Real Problems of Economic Theory": "Departing From Robinson; Intensification and Measurement of Labor Productivity"]

[Text] The sharp acceleration of the rates of development presupposes a rapid assimilation of the scientific and technical achievements that revolutionize production. Among the conditions that determine the movement of scientific and technical thought from the laboratory to the shops are the indicators of planning and stimulation. How is labor productivity measured under the conditions of intensification of production--the answer to this question relates directly to the destiny and rates of scientific and technical progress. Unfortunately, one cannot say that up to this point the indicators have been working for scientific and technical progress. It is rather on the contrary. Why? The author of this article, on the basis of his understanding of the question, gives an answer to it and brings up for public judgment the corresponding proposals. Let us recall that his last article in EKO, "What Is Holding Up the Potential of Collective Labor" was published in No 3 for 1984.

Eternal Indicator

Hydraulic extrusion was invented a quarter of a century ago in our country. This made it possible to obtain from metal profiles of rolled metal in various forms and also prepared items without losses. The powerful installation goes through metal like a meat chopper grinds meat, replacing 400 ordinary machine tools. It weighs one-thousandth (!) of what one of the others weighs, and it costs tens of times less. Expenditures on its production are recouped in... 20 minutes of operation.

The use of propylene film in condensers makes it possible to reduce losses in energy systems to one-third (their level can be brought down to 5-6 percent) and improve the quality of electric energy. The possible savings is estimated in millions of rubles a year. The production of propylene film was envisioned as early as the 8th Five-Year Plan (1966-1970) but the equipment installed at two plants is not operating even today.²

Since 1975 the Saratov Electric Aggregate Association has been producing principally new installations for purifying oil and other industrial liquids. They are much smaller than the conical separators that have been produced for a long time and they are 4-5 times more productive. Expenditures on removing the precipitate are one-300th the amount when using filter packets in separators, almost the initial quantity of oil is returned, and the cleaned oil can be put to use up to six more times. The service life of the machines increase 3-8-fold, and expenditures on spare parts, repair and technical servicing decrease by a factor of 2-7. It has been calculated with complete satisfaction of the needs of the national economy for Saratov installations (\$70,000 a year) it would be possible to save 30 billion rubles annually.³

Installations for continuous smelting of steel were invented in the USSR 30 years ago. Their application in a block with rolling mills makes it possible to reduce the area of a metallurgical plant by 40-50 hectares, to reduce the distance of plant railways by 10-15 kilometers, and to eliminate wastes during smelting (10-12 percent with the existing technology). Additionally, losses of metal during burning are reduced (12 kilograms per ton) and the expenditure of iron ore-producing ingots is eliminated—another 10-15 kilograms per ton. From the same quantity of initial raw material it is possible to obtain an additional 122-147 kilograms of rolled metal from each ton with reduced expenditures of energy and better quality of metal. At the same time heavy and harmful manual labor is eliminated. The savings in the national economy with the use of installations for continuous smelting of steel could amount to more than 7 billion rubles a year (just melting the steel with these installations is less expensive by 12 rubles per ton).⁴

Why are these and other inventions like them not introduced for a long time, even though they promise billions of rubles in savings? Strange as it may seem, the fact is that the better things are for the national economy as a whole, the worse they are for the producer. Specifically, everything relies on production volumes or, more precisely, on reducing them. The little installations for hydraulic extrusion in terms of this parameter are in no way comparable to the multi-ton presses, and the Saratov "innovation" cannot be compared with the ordinary costly and heavy separators. Installations for continuous smelting of steel do not produce the proper volume of propylene film either. What "suffers" here is the indicator of labor productivity which is calculated as the quotient from dividing the volume of production in value terms by the number of workers.

Even F. E. Dzerzhinskiy, when chairman of the VSNKh, drew attention to the shortcomings of the indicator of labor productivity. This was in 1924. Since that time this indicator has been subjected to criticism but it has continued to exist. To be sure, when preparing for the economic reform of 1965 an attempt was made to remove it from the list of directive indicators, but even here it held its own. Certain economists have reconciled themselves so much to the shortcomings of the indicator of labor productivity that they have begun to "construct a theory" for its behavior: "An increase in labor productivity is accompanied an increase in the value of products and wholesale prices for them," "It is becoming a fact (!) that value increases (as a result of increasing substantial outlays) with a steady increase in labor

productivity."⁵ And yet it is well known that, referring to the attempts by M. I. Tugan-Baranovskiy to substantiate the possibility of increasing labor productivity without even reducing product value, V. I. Lenin once said: "Increasing labor productivity without reducing the value of the product: this is absurd if it is taken as a general phenomenon."⁶

A little explanation is needed here. According to Marxist theory, the value of a product is created only by labor. Yet as the value of a product increases this shows that there is an increase in expenditures of labor on its production. If the useful properties of a product remain unchanged there is no justification for speaking about increasing labor productivity here. Labor productivity declines if expenditures of labor on the product increase. And to explain an increase in value "with a steady increase in labor productivity" by the increase in "natural outlays" means to allow at least a mistake in logic. If the substantial outlays did not include labor expenditures, they could not lead to an increase in value.

And so it is the indicator of volume toward which--whether they like it or not--economic executives must be oriented. Its field of attraction is such that only a few can resist it. It determines the thinking of the manager, his interests and his behavior.

At the end of the 1950's at the Spasskiy Cement Plant they created the first domestic furnace for the dry method of producing cement. For each ton of sinter this method uses 122 kilograms of conventional fuel as compared to 222 kilograms with the old (wet) method. If the USSR Ministry of the Construction Materials Industry were changed over to the dry method, it would be deprived of part of the value volume of production and the same quantity of sinter. This changeover would require capital expenditures, and the volume of production would not increase. Labor productivity and physical indicators would not increase, and in value measurement it would decrease. Although the USSR Ministry of the Construction Materials Industry as early as 1972 gave an order to put into operation eight automated lines for producing cement by the progressive method, three of these eight have not been put into operation yet. During the past 10 years 30 technological lines have been accepted for operation, but only seven of them are using the dry method. Leaders of the ministry have continued to order equipment for technological lines that are operating according to the energy-intensive wet method. By the end of the 11th Five-Year Plan of the 130 million tons of cement produced annually only 18 percent are to be produced by the dry method, and the annual overexpenditure of energy resources will remain equal to 10 million rubles of conventional fuel.⁷

Of course no indicator in and of itself will replace technical progress as such. But can one really say that the reliability of our judgments about the changes that are taking place does not depend on the indicator that is used for evaluating labor productivity? It is hardly an accident that during the past decade the proportion of inventions and discoveries applied in the national economy dropped from two-thirds to one-fourth, and the managers of enterprises as usual are using every means of avoiding technical innovations if they threaten a reduction of existing indicators.

For a long time there have been neither technical nor technological barriers on the path to continuous smelting. So far our country has been waging an unsuccessful struggle for changing the policy of the USSR Ministry of Ferrous Metallurgy while our patents have been used abroad to assimilate the progressive innovation and they have even sold us improved installations. We are now smelting 9 million tons of steel according to the new technology, but we could and should be smelting several times more than this.

Many specialists and managers are against volume indicators and for a change in the existing system of indicators,⁸ but so far there is no generally accepted solution and this cannot but disturb us: the existing method of measuring labor productivity (dividing "expenditures" and gross indicators by the number of workers) will inevitably show a decline as the economy moves along the intensive path.

The Teachings of Karl Marx on Labor Productivity

Current views on the nature of labor productivity recall the ideas of the ancients concerning the structure of the universe. They placed an immobile earth at the center of the universe and everything else revolved around it. It was sufficient to look at the sky to be convinced of this. Nicholas Copernicus, as we know, rejected the idea of the "central" position of the earth in the universe. And even though everything was put in its place after this, the previous "obvious" ideas prevailed in society for a long time.

In the currently established ideas about labor productivity the position of the immobile earth is occupied by Robinson in the process of labor he carried out. Everything that Robinson had was the work of his hands and the expenditure of his time, which corresponded with astronomical time. It was sufficient to divide the number of products he created by the time it took in order to obtain the hourly, daily and so forth productivity of his labor. Hence also the evaluation of public labor productivity: it is necessary to divide the quantity of products produced by the number of workers. There is an attractive force in this simplicity.

To be sure, the simplicity is only apparent. In fact, various products are required to satisfy the various needs even of the lonely Robinson. Therefore he was forced to divide up his time in order to satisfy various needs. And it was impossible, and there is not always any point in determining which kind of work is more productive and how one kind of work cannot be replaced with another. This same situation remains in the society today with its division of labor not only among various needs, but also, as it were, within the individual need, among the various workers.

And Robinson did not try to determine the overall volume of his "output." He accounted for time expenditures individually for each kind of activity. As distinct from him, many economists have tried to calculate not the changes in time necessary to satisfy each individual need, but the changes in the "volume of output" produced during a given time per one worker. The natural differences among products intended for satisfying various needs were considered to be inessential, and the usefulness of an individual kind of product was to be determined through the amount of working time necessary to

produce it. Proudon also tried to prove that "the time necessary to produce a good designates precisely the degree of its usefulness."⁹

Thus the problem of comparatively measuring the incommensurable was "resolved" in two devices. First, they assumed that there were no difficulties. K. Marx called this device the "absurd evasion of mill."¹⁰ Second, the consumer values of the products were equated with their exchange values, and the quantity of labor included in them. "Difficulties are eliminated by the fact that the consumer values of the goods are called exchange values."¹¹ Because of this it became possible to calculate the volumes of any "output," even if it does not end with manufacture (incomplete production of builders). With the help of this device, as we have already noted, they "established" the fact of the increase in value when there is a steady increase in labor productivity.

When labor productivity was defined by dividing the "output" by the number of workers one more difficulty appeared: the time necessary for producing one product or another changes with each change in the productive force of labor: the former increases when the latter is reduced and vice versa. (And these are precisely the changes that must be measures!) The concept of labor did not make it possible to cope with the last obstacle either. It was established conventionally that regardless of how much change there was in the time necessary for producing a product and, consequently, its price, the same prices would be applied for determining the quantity of output per unit of time. The inertia of thinking was so strong that instead of real changes in labor productivity they prefer to calculate what only seem to be changes in labor productivity.

The contribution of K. Marx to the idea of the productivity of public labor consisted in that he eliminated from them the Robinson who had created everything for himself because of division of labor in a society makes it pointless to define labor productivity "according to Robinson," per one worker.

Marx's formula: "Labor productivity in general = the maximum product with the minimum labor."¹²

Here the products do not revolve around Robinson as all the heavenly bodies revolved around the earth in Ptolemy's system, but human labor is embodied in various products. Therefore a reduction of the overall quantity of labor in the production according to Marx "should serve as an essential indicator of an increase in the productive force of labor under any social conditions of production. In a society in which the producers regulate their production according to a previously outlined plan...labor productivity would undoubtedly be measured by this scale."¹³

Let us call this point of K. Marx the first point in his system of ideas about the measurement of labor productivity which reflects the reality of social division of labor in the production of each product.

The second point could be called Marx's categorical refusal to confuse the product's useful properties with its value and to substitute one for the other

(exchange value and consumer value in and of themselves are incommensurable quantities).¹⁴ From a study of the dual nature of labor it follows directly that one cannot directly compare labor productivity in the production of various kinds or products. "When we speak about greater or lesser productivity we are speaking about one and the same kind of product."¹⁵

In practice this axiom excludes the indicator of "output" both for ideas of volume and for measuring labor productivity. K. Marx did not use this term at all and always clearly distinguished the value of a product from its physical form. In our ingrained ideas, on the contrary, physical products are replaced by their value without any stipulations--complete, partial or "unchanged"--which corresponds to sold, conventional net or net (normative) and gross output. Then they forget about this replacement and begin boldly to speak about the value and production cost of these "products."

The importance of the second point is confirmed by the need that has been placed on the agenda for accounting for the list of products produced when evaluating the work of labor collectives.

The third point can be formulated as follows: The quantity of labor that is socially necessary for producing one product or another forms the value of this product and in production relations among people it acts as a form of price. Under capitalism the price is determined during the course of the competitive struggle, and under socialism--under a planned policy.

This point pulls the rug out from under those who like to speak about the productivity of live labor as distinct from the productivity of live and past labor. In the complete manufactured product all labor is past, and when one can speak about live labor there is not yet a prepared product ("The process is extinguished in the product").¹⁶ In any case the consumer is never interested in how much live labor and how much past labor is included in the product. What is of interest to him is the price of the product. When distributed according to labor he must first of all imagine how much of his own working time will be required to obtain the necessary sum. For him any increase in labor productivity would mean that now he would have to expend less of his own working time in order to acquire the corresponding products. Thus labor rewards itself by becoming more productive if the principle of distribution according to labor is in effect.

With a scientific approach to the problem of measuring changes in the productivity of public labor the so-called law of more rapid growth of labor productivity as compared to the growth of the average earnings turns out to be just as apparent as the law of the sun revolving around the earth in Ptolemy's system. In reality, with an increase in the productivity of public labor the nominal earnings can remain the same or even decrease--in other words, we can simply work less time--and the real earnings will increase to the same degree as the productivity of public labor increases. A real increase in the productivity of public labor means that it is possible to live better while working less.

The fourth point in the teachings of K. Marx concerning labor productivity: it is necessary to distinguish changes in labor productivity from changes in the

expenditures of the labor itself. Marx discovered the confusion of these two processes as early as in the discussions of Richard Jones and pointed out the inadmissibility of this.¹⁷

The fact is that the quantity of products produced with the same quantity of workers depends on three circumstances: (1) the length of the working day or the extensive amount of labor; (2) changes in the intensiveness of labor; (3) the productive force of labor, that is, the degree of development of the conditions of production whereby "one and the same quantity of labor within a given period of time can produce a larger or smaller quantity of output."¹⁸

In other words, a change in the productivity of labor as a realized expression of the degree of development of the conditions of production—as distinct from the productive force of labor which only "can give"—should be taken into account separately from changes in the quantity of labor itself during a given period of time, that is, separately from changes in the intensiveness of labor.

The fourth point is of continuing significance under the conditions of socialism where it is necessary to observe the principle of distribution according to the quantity of labor. But changes in the quantity of labor itself have taken into account only its extensive amount in the absence of state accounting for the intensiveness of labor and the conscious utilization of this indicator in distribution according to labor. Nonetheless the objective need for this accounting, difficult as it may be, is making its way in life. Things would undoubtedly go more quickly if this need were recognized. In this case we have in mind the gradual changeover from indicators of gross, commodity and sold "output," as expressions of the volume of production, to accounting of the so-called net output (normative), which actually represents part of the value of any product of labor, which should be created during the course of a given amount of time by the labor contribution of the production collective.

The indicator of NChP [normative net output], which is intended officially for accounting for the volume of output and the growth of labor productivity, in reality cannot serve as a measurement for either one, but only the labor contribution of the given collective for a particular time interval and the amount of this contribution per worker. It can characterize only the intensiveness of the labor of a given collective with given conditions of production. This assertion can be deduced correctly even from the Methodological Instructions concerning the policy for the development and application of the NChP, which envisions a change in the indicator of the NChP "when in individual production associations (enterprises) there is a change in the conditions for cooperation as compared to those taken into account when forming the wholesale prices and normatives of net output."¹⁹ Let us illustrate this assertion with an example. A brigade of construction workers which had previously assembled a building from panels and coverings changed over to assembly from three-dimensional elements. As a result it began to assemble during a year, say, six buildings from three-dimensional elements as compared to two panel buildings. The actual volume of "output" increased threefold although the indicator of the NChP with both the old and the new technology should have been the same, that is, only the conditions of

cooperation changed. Therefore the indicator of the NChP is not suitable for evaluating the quantity of "output." This indicator does not "notice" changes in labor productivity in the construction of buildings either since it does not change in relation to the number of workers even in light of current ideas. The quantity of labor necessary for constructing a building can be "noted" only by the price of the building with cost-accounting for construction work--for example, by the collective contract method. If the price of a building constructed from three-dimensional units is less than that of a panel building, and the price should take into account both the amortization of fixed capital and production services of other materials (batching materials, energy, transportation and so forth) and the labor contribution of the collective itself, the NChP, this means that labor productivity when changing over to the new technology of constructing buildings increased by exactly the same amount as the price of the building decreased.

The application of the NChP thus solves only one problem--accounting for changes in the intensiveness of the labor the construction workers and accounting for changes in the amount of their labor contribution to the construction of the buildings. If after a certain amount of time the brigade of assembly workers can consolidate their working time and assemble during a year not six but seven buildings using the same technology, the indicator of the NChP will show us the increase in the intensiveness of the labor of the construction workers. And this increased intensiveness will be achieved only if the normative of wages per ruble of NChP is stable for a given technology of assembly.

When determining the quantity of labor and public production, one uses its productivity with the socially normal intensiveness of labor. In practice, the normal intensiveness of labor under the given conditions of production can be taken into account by a technically substantiated norm which determines the productivity of expenditures of working time for a particular kind of work. A worker who does not come within the norm is working with less intensiveness and is not a normal worker. A worker who is expended less time on a given job then is assumed according to the norm is working with increased intensiveness. With a change in the technical and organizational conditions of production the time norms should be revised. And if it decreases under the same conditions of production, this means an increase in the socially normal level of intensiveness of labor.

Thus, as distinct from Robinson, for whom there did not exist a problem of separate accounting for the productivity and intensiveness of labor since he had nothing with which to compare his individual time of labor and the entire output belonged to him, in the public process of production the determination of the quantity of the labor by the working time presupposes the establishment of a time norm. This norm serves to determine the labor contribution of the worker who participates along with others in the creation of one product or another. When we calculate the newly created value per one worker for a particular time interval we are thus determining not "the productivity of labor according to the net output," but only the intensiveness of labor. And here Robinson's presence is indeed necessary for only the worker himself can be a source of labor and a creator of value. It is no accident that K. Marx

explained the concept of value in "Das Kapital" using the example of Robinson. Labor productivity determined according to the first point, on the contrary, excludes Robinson.

And, finally, the fifth point was formulated by K. Marx as follows: "From the social standpoint labor productivity also increases when it is saved. The latter includes not only savings on means of production, but also the elimination of any kind of useless labor."²⁰

This fifth point of K. Marx's comprises the construction of that compass of effectiveness with which, it seems to us, it is possible to eliminate many obstacles on the path to intense development.

From Theory to Practice

How significant are the points described in such detail here in the real process of solving the existing problems?

Let us turn to the problem of reconstruction of existing enterprises. Under modern conditions this is the shortest way of changing the economy over to an intensive path and introducing the latest achievements of science and advanced practice into production. But in the mirror of existing indicators of the volume of output and labor productivity it is not advantageous to the construction workers. Here is what the UkrSSR minister of industrial construction, A. Shchepetilnikov, says: "...Let us assume that the trusts of the construction ministries direct their main efforts toward reconstruction and reequipment of existing plants. The overall volumes of the work they perform in rubles decreased immediately because expenditures of materials per ruble of work are much less. This leads, in the first place, to a 'decline' of the rates of increase in the volume of production in rubles, in the second place, to a 'reduction' of the growth of labor productivity, in the third place, to a reduction (without quotation marks) of the wage fund, in the fourth place, the economic incentive funds shrink (also without quotation marks), in the fifth place, many organizations fall into a lower category and the managers of the trusts lose some of their earnings...all of them end up among the backward ones with all the consequences that ensue from this."²¹

There is no need to get stuck on the "reduction of overall volumes of work performed in rubles," or the "reduction" of the increase in labor productivity if one takes the labor expenditures of the construction workers into account separately and links the wage fund directly to them. But one is curious about what is suggested for solving problems of reconstruction.

Minister A. Shchepetilnikov insisted that we do not measure all construction workers by the same standard: "It is impossible to carry out reconstruction according to the same normatives for determining the value of work that are applied for new construction. Special normatives are needed for this. In keeping with these it is necessary also to introduce a plan for labor." Then he suggested a differentiated approach to the planners as well, for whom "reconstruction as the least expensive object also remains a 'Cinderella'."²² These suggestions return us to the first two points of the teaching of K. Marx concerning labor productivity.

D. Valovoy, M. Odinets and V. Parfenov, when speaking about a "sharp increase in labor productivity" as a result of reconstruction, use as a means of fighting against the varying degrees of advantageousness of the work for reconstruction and with new construction they suggest "the wage fund...be determined on the basis of the labor-intensiveness of the work according to estimates," "organically" coordinating it "with the quantity and quality of live labor of the trust's collective itself."²³ This corresponds to the requirements of the law of distribution according to labor and to the second, third and fourth points of K. Marx—not to confuse various kinds of work with each other and to determine the cost of each work (each job has its own estimate) and to take into account the quantity of labor individually (expenditures of live labor of the trust's collective).

The fact that reconstruction is less expensive than new construction clearly confirms how crucial the fifth point of K. Marx is. "In order to economically motivate the collectives of general construction trusts to reconstruct existing enterprises, it would be expedient to evaluate their work not according to the increase of expenditures, but according to the real contribution to the final result and the increase in return from their live labor."²⁴ It does not say how this "increase in return from their live labor" instead of "increase in expenditures" is concretely expressed. So far we have been using the indicator of "productivity of live labor" precisely in rubles of expenditures per one worker, which impedes reconstruction and makes it disadvantageous for the builders. Will it be possible without reconstructing ideas about labor productivity to overcome the existing attitude toward reconstruction of enterprises?

The Indicator of Labor Productivity

In order to familiarize the reader with the methods of utilizing Marx's points when measuring the productivity of public labor, let us take a concrete example. At the Melitopol Compressor Plant 10 years ago the production of rings for compressors was a "bottleneck." The iron that was brought in had to be melted in cupola furnaces, poured into earthen forms, released from them, the shavings had to be removed from the future ring and the sliding surface had to be polished. Such an iron ring served for 3,000 hours in the compressor. The labor-intensive ring, although they cost 2.2 rubles each, was a "disadvantageous" product for the enterprise, and for the consumers of the compressors for the same reason it was an item in extremely short supply, without which the entire compressor became scrap metal. It was easier for the consumers to obtain a new compressor than spare rings. The "pushers" laid seeds upon the enterprise, demanding the spare rings for compressors that were to be provided from the funds.

The director of the enterprise gave an assignment to find a solution to the problem. The designers and technologists soon suggested manufacturing the rings from a new material that is obtained on the basis of capron. The capron ring was obtained by the stamping method. In testing it worked 13,000 hours without any apparent signs of wear and tear and it also provided a savings on lubricants in an amount of 1 ruble per year. The new ring costs 27 kopecks.

The replacement of iron rings with capron made it possible for the enterprise to reduce the expenditures of its labor to one-tenth the amount expended on the previous quantity of rings, to reduce the need for equipment and production space, to stop shipping 300 tons of iron, for now only 6 tons of capron were needed, and to reduce the "production" of iron shavings. In the future only one-fifth the quantity of rings will be needed since each ring serves 5 times longer.

The advantage for the consumer is provided by the sharp reduction of the price of the ring (by a factor of 8.15), the savings on lubricant--5 rubles during the time of service of each ring, and savings on the replacement of the rings --the new rings have to be replaced one-fifth as often.

Having calculated the total savings of public labor, the manager of the plant replaced one type of iron rings with capron and by the end of the year produced the plant quantity for the consumers--500,000 rings. But the inexpensive and technologically advanced ring reduced the volume of the plant's product sales by 1 million rubles and the mass of profit from the rings to one-eighth the former amount. The indicators of output-capital ratio and profitability decreased correspondingly. The indicator of labor productivity when calculated in physical terms--weight--decreased to one-tenth, and when calculated in rubles--to one-eighth. because of the reduced quantity of iron shavings the plan for turning over scrap metal was threatened.

Not wanting to be someone who was accused without blame--after all, the demand for rings was satisfied with a reduction of expenditures of public labor--the director turned to the ministry with a request substantiated in detail to reduce the planning indicators because of the changeover to the production of the economical rings. Even without this the ministry had not fulfilled the planning assignments for increasing sales, profit and labor productivity. Therefore it answered curtly to the plan's initiative: "You have made your bed, you lay in it!" Need one say that after this the changeover to capron rings was not continued either at this plant or at any of the others that produce similar items.

If one takes into account that 40 million compressor rings are produced annually, the country loses 120 million rubles a year on iron and lubricant.

The indicators that are applied annually cost the national economy tens of billions of rubles of labor expended for nothing and this amount is increasing as the potential capabilities of the utilization of the achievements of scientific and technical progress increase. The fact that we occupy one of the leading places in the world in terms of the expenditure of raw material and energy per unit of national income and frequently are behind the consumers of our patents in assimilating the production of the corresponding items is due to no small degree to the system of indicators we apply for planning and stimulating production.²⁵

Let us consider the "ring" problem from the standpoint of K. Marx's points.

And so the quantity of labor for the manufacture of a ring reflected in its price when changing over from the iron to capron variant decreased 2.2 rubles/0.7 rubles = 8.15-fold. Therefore one can say that with the same useful properties labor productivity when producing the ring increased 8.15-fold. The capron ring was not only less expensive but also turned out to be more durable than the iron one. Even if labor expenditures for these rings were at the same level as for the iron one, even then as a result of the prolongation of the service life of the capron ring labor expenditures calculated in terms of the new service life would decrease 13,000 hours/3,000 hours = 4.33-fold, which would be evidence of an increase in labor productivity when producing capron rings of another 4.33-fold. Normal operation of the compressors would require producing 4.33 times less capron rings as spare parts than iron ones. This is not included in existing ideas about labor productivity, for now fewer rings are being produced.

Thus a reduction of the quantity of labor in the capron ring by a factor of 8.15 would correspond to an improvement of its useful properties--an increase in service life by a factor of 4.33. This provides for increasing labor productivity $8.15 \times 4.33 = 35.29$ -fold.

The general formula of the index for changes in labor productivity (J_{pt}) looks like this:

$$J_{pt} = \frac{PSn}{PSst} \times \frac{Cst}{Cn}$$

where PSn and $PSst$ are the new and old useful properties of the product; Cst and Cn are the old and new prices of the product.

The determination of the changes in labor productivity when producing various products according to this formula shows the immense advantage from all those changes in technical equipment, technology and organization of production which have not yet become widespread because of the primitive approach to determining the changes in labor productivity.

But we have not yet answered all the questions raised by the capron ring. In addition to the reduced cost and durability, which have already been taken into account in the formula presented above, the ring saves on lubricant. Even if all the other parameters of the wheel had remained the same, just the fact of the savings on lubricant with the capron ring would be sufficient, according to K. Marx (Point 5) to see an increase in labor productivity from replacing the iron rings with capron ones. But how can one quantitatively evaluate this increase in labor productivity from saving on labor in another place?

In order to answer this question let us recall that the law of increasing labor productivity and the law of economizing on time are two names for one and the same law, and any savings in the final analysis amounts to saving the working time of the society. Therefore for a quantitative evaluation of the increase in the productivity of public labor it is necessary to calculate the amount of savings in the public form of labor--rubles--provided by the expenditure of labor on the satisfaction of a particular social need as

compared to the base variant. If one uses as a basis the time of service of the capron ring the savings will consist of the following elements: (1) the difference in expenditures on the acquisition of the iron rings as compared to one capron ring: $4.33 \times 2.2 \text{ rubles} - 0.27 \text{ rubles} = 9.53 \text{ rubles} - 0.27 \text{ rubles} = 9.26 \text{ rubles}$; (2) the savings on lubricant, which in 5 years of service of the capron ring will amount to five rubles. To these two variables it would be possible to add also the savings on the assembly and disassembly of the compressor when replacing the ring, but we do not have these figures. The overall sum of savings of $9.26 \text{ rubles} + 5 \text{ rubles} = 14.26 \text{ rubles}$ is provided through an expenditure of 0.27 rubles on the manufacture of the capron ring. The index of labor productivity can be determined according to the formula:

$$J_{pt} = 1 + \frac{E}{C} = 1 + \frac{14.26}{0.27} = 52.81$$

By multiplying the index of labor productivity by the sum of sales of items with the given index minus the sum of sales will produce the amount of savings of public labor in rubles in the national economy during the time of service of this item. A total of 500,000 capron rings at 0.27 rubles each will produce a savings in the amount of: $(500,000 \times 0.27 \times 52.81) - 500,000 \times 0.27 = 7,100,000 \text{ rubles} - 135,000 \text{ rubles} = 6,965,000 \text{ rubles}$.

With the possibility of determining the changes in labor productivity for each item it is not difficult to calculate also the changes in the level of labor productivity for any set of items with the help of the Strumilin index, using as the weight of each item the sum of sales of these items according to prices used in the index:

$$Y_{lp} = \frac{\sum_{n=1}^n J_{lp}^n p^n}{\sum_{n=1}^n p^n}, \text{ where}$$

Y_{lp} — level of labor productivity;

J_{lp}^n — index of labor productivity for n items;

p^n — sum of sales of products of n kind;

n — quantity of items from whose totality one determines the changes in the level of labor productivity.

The utilization of Marx's teachings about labor productivity and the practice of planning and stimulating production makes it possible to evaluate the work of any collective according to two major indicators.

First, how much "live" labor of a given collective is invested in the production of one product or another during a particular time per one worker. For this purpose one needs the normative of "net output," NChP, or the amount

of the newly created value in the price of the given item. Part of the labor contribution--the normative of wages per ruble of NChP--should be placed at the disposal of the labor collective for distribution according to labor, and the other part should be disposed of by the entire society.²⁶

Second, how much public labor has been saved as compared to the base period while satisfying the social need for products produced with the participation of the given collective. This purpose is served by the indexes of labor productivity for each kind of product and the aggregate index (the Strumilin index) for the corresponding set of products. With this kind of evaluation the products that would be "advantageous" for the enterprises and ministries would be hydraulic extrusion installations and installations for continuous smelting of steel, installations for deep cleaning of oil and polypropylene film, the reconstruction of enterprises and the dry method of producing cement.

Technical conservatism in all of its forms and inefficiency would be disadvantageous and clearly apparent to everyone.

Instead of an individual drive for an additional quantity of rubles there would be an economically advantageous and morally approved general striving to utilize better all the possibilities of reducing the cost of the production of consumer goods with the help of the production of more effective means of production that are offered by scientists, designers and technologists during the course of the scientific and technical revolution.

Of course it is impossible in one article to consider in detail all the issues related to the application of indexes of labor productivity in the national economy. But it is possible to draw one conclusion even now: there are no special difficulties in utilizing Marx's points, but it is necessary to coordinate the actions of the USSR Gosplan, the State Committee for Science and Technology, the State Committee for Prices, the Gostandart, the State Committee for Labor and Social Problems, the Central Statistical Administration and the ministries. It is necessary for them to organize supervision to make sure that the prices correspond to the socially necessary expenditures of labor and control over planning of production of those products whose application for the satisfaction of public needs leads to an actual savings on their expenditures.

A rejection of the prevailing ideas about the measurement of labor productivity will make it possible to improve our production relations and take full advantage of the extremely rich potential possibilities of a society of developed socialism.

The cancer of outdated ideas should be destroyed!

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PRESTIGE OF DESIGN WORK DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 112-128

[Article by G. A. Pushkarev, chief of the design sector of the Scientific Research Institute of Heavy Machine Building of the Uralmash Production Association (Sverdlovsk): "An Anatomy of Design Prestige"]

[Text] "Modern production insistently demands that any position be entrusted only to a professional with precisely the appropriate specialty and level of education. Otherwise we shall be patching up holes forever," an engineer from Voronezh, T. I. Gavrilova, writes to the editors. A similar opinion is held by other readers as well. Many of them think that engineering personnel should be selected taking into account the nature and predisposition of the individual; it is necessary to reach a point where every engineer works conscientiously, with full exertion of effort and this work becomes a need and not a result of constant external supervision.

But how does one provide for a radical change in the attitude of engineering and technical personnel toward their labor? How does one increase their contribution to the intensification of the national economy and the acceleration of scientific and technical progress? Today we again turn the floor over to specialists who are trying to figure out these complicated issues and suggest measures which, in their opinion, will help to increase the prestige of engineering labor.

The devaluation of the title of "engineer" has taken place historically, particularly because of the constantly growing differentiation among technical branches of knowledge and the specialization of engineering developments. "Since previously there was no narrow specialization the engineer had a broad view. With the development of science and technology new branches of industry grew up and technology improved. New occupations appeared. The labor of the engineer became more complicated. Branch specialization came to

his assistance."¹ To a certain degree this has narrowed the engineering horizon to within the frameworks of "his own" profile.

At Uralmash, for example, several design services are engaged in the development exclusively of reduction gears, drilling winches, transportation devices and welded metal structures. Is this good or bad? When working with some one thing it is possible to achieve perfection in this, "limitation produces a master." But specialization also has its negative consequences. The burdensome monotony of the work bothers people and not everybody can adapt to it. The prestige of this kind of labor is declining.

Let us note that narrow specialization, when "it is necessary to know a little bit about everything and everything about some little bit," and the corresponding loss of prestige have affected not only engineers, but also representatives of other occupational categories. Leafing through the handbooks for people entering VUZes you will discover there the concept of "specialty with a critical shortage"--a product of permanent occupational specialization. And this is a predictable phenomenon, and it is a substantiation and a basis for the decline in prestige. And there is no way to get away from it, since it is the result of the scientific and technical revolution.

But the prestige of each occupation is also affected by side phenomena, those which are superimposed. I shall list several of them which pertain to the occupation of the designer.

Numerous Distractions

This is regularly discussed on the pages of newspapers and magazines. According to calculations of economists, the divisions of machines for continuous smelting of billets of the Scientific Research Institute of Heavy Machine Building (the place where the author works), an average of 10-12 percent of the supply of working time of designers goes for these distractions. They are agricultural workers and yardmen and road workers and subway builders. Designers, ruled by schedules and orders, scrape out the boilers in the plant dining rooms, remove the construction rubbish out from under new buildings, wash windows in public buildings, and sort out the spoiled goods at vegetable bases. Unfortunately, Uralmash is not alone in this.

Low Wages

As we know, certain positive strides here were earmarked by the Decree of the CPSU Central Committee, the USSR Council of Ministers and the AUCCTU, "On Improving the Wages of Scientific Workers, Designers and Technologists in Industry." There are hopes that the situation will improve.

But so far even under the conditions of the economic experiment, which was started recently in our plant scientific research institute, we have not managed to eliminate this evil. Everything relies on a stable wage fund: it is possible to increase the salaries of the "good" designers only at the expense of the "poor" designers, for example, to reduce their bonuses, or else

to get rid of them completely, say, because of professional unsuitability. It is no secret that in certain places (and they have involuntarily reconciled themselves to this) there is the so-called "ballast"--one or several people without whom the collective could do quite easily (they are not dedicated and they are inclined to be lazy). Getting rid of such people would produce "free sums" for a certain period. But try to get rid of them!

Several years ago a commission for revealing internal reserves which was working in our plant received a suggestion from a worker of the so-called "replacement group"² to reduce this "ballast." She made a commitment to perform its volume of work under the condition that her salary be increased by half of the sum that was "saved." Members of this commission thought about this proposal for a long time. No, it did not have a subtext, there was no justification for "settling accounts." The person sincerely recognized that it is possible to do with a smaller staff and felt capable of "making up for the loss." The management decided to leave the "ballast" in the job, and the worker with initiative was to have been given a 15-ruble increase in their salary "because of her initiative." Of course other solutions are also possible....

Let us say that all untalented and mediocre people were let go and there remained only "go-getters," and everybody was working intensively and with enthusiasm. Where would one get the money for their incentives, perhaps, redistribute the coefficient of labor participation? And if several designers in a collective fulfilled the production assignment by 150 percent and the remainder by 120 percent, how would this coefficient, which is supposed to objectively reflect reality, "react" to their successes? What this leads to is this: in the calculated part they do not use the records of the designers if their coefficient of labor participation equals 1. It is impossible, they say, for everyone to work identically. True. Not everyone works identically: one works well and others work very well. But how can one degrade a person who has fulfilled his assignment in order to provide incentive for one who has fulfilled it a little bit better? This does not contribute to a health psychological climate in the collective. There was a time when such coefficients did not exist and nonetheless everyone worked well and received fairly good wages for those times).

It frequently happens this way: the plant workers receive a bonus but the associates of the scientific research institute do not or else they receive very small ones ("You," they say, "do not belong to the plant"). Although without the blueprints of these "nonplant workers," the enterprise could not survive for even a day. And when the designers are "allowed" a bonus for new technical equipment, it is divided up amongst everyone. It turns out that it is shared by the workers in the supply division, the workers in the division for buildings and grounds, various planning and economic subdivisions, not to mention the "pure plant workers."

Honored designers have begun to leave the plant scientific research institute. Why? Someone somewhere "unearthed" the fact that it is a policy for the institute that when a working pensioner receives a pension, his salary (up to certain limits) is not in effect. This pertains only to engineering and technical personnel who are working directly at the plant. And here is the

result: with a critical shortage of experienced, knowledgeable designers they are losing people who could produce an even greater advantage.

Designer or Chief Clerk?

Creativity should prevail in the work of a designer. Loading him with other work and excess paperwork is the third superimposed phenomenon that has a fatal effect on the designer's prestige.

More than 20 years ago the author of these lines wrote in IZVESTIYA: "In addition to his basic creative work the designer is responsible for a mass of indirectly related work and paperwork." Things have not improved since then. The situation was exacerbated by the Unified System of Design Documentation (YeSKD). When it was introduced two "layers" of technical documents "ascribed" to the designer were introduced: the required YeSKD's (specifications, operating information documents, passports and so forth) and those left in force in the local areas, based on the established practice (summary specifications, selections of hired work, lists of blueprints and so forth). Added to these were various "coordinations" and agreements, applications and lists of questions. Supply services which insist on filling out "protocols of agreements" for purchased items and "reference guides" from the producers of the products are especially insistent that these are actually produced. According to the author's calculations, 20-25 percent of the designer's "gross output" now goes for legal papers (that is, everything for which the designer is responsible except for blueprints).

Except for the author of the plan hardly anyone can speak reliably about the design. This means that the designer cannot get away from work related to the blueprint. Nor can he avoid that part of his job correspondence which is an element of technical communication. But a good deal of paperwork could still be painlessly reduced by transferring it to other services. For example, the service for standardization asks for a number of connecting pipes (in various type sizes) which are used throughout the year. Such information can be obtained from the production workers, and it will be more precise. But false intuition goes to work--what if suddenly they are mistaken? Designers are assigned numerous technological issues: standards, tooth sizes, various sets of methods and programs for testing, and so forth. And the technologists still have to recheck them and reprocess the figures given by the designers.

Much of the "outside" correspondence would fall away of its own accord if we had good catalogues for purchased equipment. Now up to three-fourths of the job correspondence comes out of the pen only because it is necessary to provide more information about a particular batching item. The reasons? The people who created the catalogues did not consider it necessary to indicate two or three sizes necessary for using an item or they "melted down" some important indicator from technical specifications. Sometimes this correspondence goes on for years. Is there a solution? We think there is. First, it is necessary to revise the documents assigned to the designers, to combine some of them and to completely abolish others; second, it is necessary to improve information supply in the country; third, it is necessary to specialize "design-related" work--to organize specialized bureaus or groups for filling out technical documentation where the designer would send the

completed blueprint along with "specifications for the YeSKD" and where they would prepare the remaining documents with them.

The main thing (regardless of whether the designer himself is occupied with paperwork or if this is put to the side) is mechanization of "compiling" labor. So far the movement for scientific organization of labor has not made its way here. And yet a large amount of auxiliary design work could be put into the proper form and processed by machine.

Everyone has seen the work of a cashier in a savings bank or a railroad office: they gather the information, place documents into a printing device and press a button--and all the necessary information is automatically entered onto the forms that are provided. Why not adapt similar machines for the needs of designers?

Let us imagine this picture. At a printing apparatus joined to a computer there is an ordinary designer with the rank of technician or draftsman. In front of him are blueprints created by his senior colleague and "specifications for the YeSKD." The memory of the machine has all the details and items according to standards of the enterprise (at Uralmash there are more than 1,100 of them), GOST and marketed batching items, which are frequently repeated, previously produced parts, and so forth. Let us say a bolt is used. We find the number of the STP, the type size of the metal part, and the machine gives the complete designation, GOST, materials, mass and other necessary information. If necessary it fills out several documents at once. The machine can also be made responsible for doing working blueprints of nonoriginal parts (bent pipes, items made of rolled profiles) on which the designers spend a good deal of time. Unfortunately, for us this is still only an area of fantasy.

Everything Is Dependent on Everything

Untie the hands of the designer and remove all of his restrictions from him so that he can manifest himself at full force!

The commercial and technical services, finance workers and norm controllers act as vigilant guards to make sure that the designer stays within the framework of what is allowed for him, threatening at their earliest convenience to "call him to order." Try to use a purchased item if it is not included in the information provided by the Gossnab. There is only one answer: "Since it does not exist in our documents you do not have the right to use it." Or try to go to a seminar for exchanging experience or to see how "your" equipment is working for our client. Even if the trip is included in the plans on time and approved by the responsible people, in the bookkeeping office they are intransigent: "There is no money, we will not permit the journey." The list of such problems could be continued. I do not think that they are the "property" of Uralmash alone.

How does one increase the prestige of the designer on this level? It would be good to create a document which determines on a statewide scale the status of design services, regardless of whether they are operating independently or are included in a plant, similar to the provisions concerning the socialist

production enterprise or the model regulations of the kolkhoz. It would clearly regulate the official competence of the designer, his tasks, rights, responsibilities and job activities, and it would provide the necessary conditions for their fulfillment. For example, one should legitimize the designer's right to apply any progressive purchased item. Commercial services would be obliged to help in this. It would also be expedient to proclaim the principle that the technical policy for batching items would be determined by the designer (and not supply workers as is frequently the case). To do this he would have to have access to complete technical information. Now he himself finds it difficult to obtain it. And it would be better to construct the information supply of the designer in such a way that he was always "abreast of events" so that the information workers would keep him always up to date.

We should establish the possibility (or, rather, the need) for creative business trips to the related enterprise (What is new and what is being done there?), to objects that have been previously put into operation (How is "my" equipment working?), and to scientific research institutes that "participate" in an interesting technical area, not to mention the corresponding conferences and seminars.

It would be a good idea if the provision introduced a creative report document --a job record of the designer (this has not existed previously). As distinct from creative plans and passports of the engineer, which are tortuously difficult to realize under design conditions since they are based on future affairs (which for various reasons are not always carried out), the job record would be a report of the activity of the designer which would provide a document to increase his prestige. Let us say that a blueprint of a machine has been developed--we enter into the job record (date, signature of division chief, stamp), a standard has been created for the enterprise, an article has been written concerning advanced experience--and these all go in there too. This would also include supervision of student diploma projects, the delivery of lectures in the VUZ, streamlining and invention. There would not only be incentives and penalties, which could be included in "personal affairs." The job record should pertain only to what has been created with technical equipment and without any superfluous trivia. It will begin to define the technical image of the designer and will be a basis for his advancement as well as a confirmation of the significance of the designer when he is awarded the title "honored."

The More the Merrier

Several years ago the author had occasion to visit the Nikolayevka CSKTB for lubricant and filter equipment. The way it was arranged was a striking contrast to what one saw in other places. Spacious, light rooms, good drafting equipment, the possibility of rapidly making a copy from a blueprint and printing the necessary material. In our head designer's division--one of the leading subdivisions of Uralmash and also of the branch for designing slab machines for continuous smelting of the curvilinear type--for one designer there are 4.5 square meters instead of 6 square meters for the SNIP. The shortage of space in the division amounts to 680 square meters. And where it is crowded it is also noisy. If it exceeds the sanitary norms the attention

of the workers is dispersed and loses its sharpness, and labor productivity decreases by 10-25 percent.³ In a good situation a person experiences almost no fatigue and a high culture of creativity increases his interest in his work. All these are established truths, but, alas, they have not always been embodied.

In recent years the fleet of machine tool equipment at our plant has been significantly updated, new technological lines have appeared, and unique sets of equipment with numerical program control are in operation. But technical reequipment has almost not affected the design divisions and there is not very much new equipment there. Everything is the same as it was 15-20 years ago, with rickety drafting tables, desks and drawing instrument cases that are too low, and primitive technical and office service.

From published articles we know about the existence of modern technical equipment for the work place of the designer: special-purpose slide rules (for calculating weights and kinematic and dynamic calculations), electric erasers, small mounted typewriters which make it possible to type a text twice as quickly as with the traditional methods. But who has them? Where are the tables and chairs that are regulated for height, the cabinets for storing instruments, the rapidograph pens, the adhesive tape for fastening drafting paper on the table, the graph drawing attachments, the phototelegraphic equipment for operational communications with shops and divisions—all publicized for scientific organization of labor? We can only dream about these.

In the resolutions of production meetings they always speak about pencils and buttons when it comes to immediate tasks for improving the labor of designers. The supply of these is revolting. For many years the designers have not even had the most common pencils of the type 2T-3T. Instead of these they stubbornly offer us 2M-3M, T, or else those that don't have any marking of the hardness at all—the so-called substandard pencils which, as they explain to the author in the RSFSR Ministry of Local Industry, are sent on the request of the enterprises for a miserly price without any charge. And if one pays attention to the fact that today's Watman paper after an eraser has been used on it wrinkles and falls apart, one can imagine what these designer "white rabbits" are like. The author always has to wash his hands in order not to be taken for someone out of the gutter.

Can the emotional mood of the designer really not be affected by the poor supply of the work places and the fact that his current needs are ignored?

If You Could See the Results of His Labor

The frequent impossibility of seeing the results of his labor, his idea in metal, and contributing fully to the further development of scientific and technical progress dampens the designer's enthusiasm and deals a blow to his prestige.

In the division of machines for continuous smelting of billets of the Scientific Research Institute of Heavy Machine Building three fat albums of blueprints are gathering dust on the shelf. The blueprints are fairly

tattered although they have never been used--the object did not make it. There is so much interesting in these albums: a mobile lubrication station, a system for cooling with a progressive bolt device, and control blocks for ordinary hydraulic equipment. The real "nugget" is not in these auxiliary devices but in the combination of two technologies--continuous smelting of slab billets and the pressure processing of the ingot that is obtained. A similar idea was realized by Uralmash designers in blueprints more than 4 years ago. The construction of the complex was earmarked in the steel-smelting shop. The new technology saves 15,000 tons of metal per year and releases 60 workers. And here are some other figures: engineering and scientific ideas become outdated in 6-8 years. Four years have already passed and not a single thing has been done at the construction site.

Is the designer the one who brings about scientific and technical progress at the enterprise? Of course. But, unfortunately, frequently he is not the one who has the last word.

"Just Call Me a Pot...."

There is a fairly widespread opinion that the prestige of the engineering name declined largely because of the excessive number of engineers in design bureaus and production, and the "omnipresence" of the epithet of "engineer" to positions that were far from being engineering positions. In my opinion, this is not a matter of titles.

There is not a single VUZ that is capable of providing its graduates with a complete volume of knowledge in their selected specialty. It is much more important to develop in the specialist a desire to systematically fill in the gaps in knowledge, the ability to apply it intelligently and to think technically. These skills determine the level of the "initial" qualifications of the engineer. His final development as a personality and his reputation in his job are provided by life. And there is no point in renaming the jobs. It is the fault of the VUZ if they orient their students toward a mechanical learning of the training material and do not develop the skills of practical utilization of the knowledge they obtain. The title of "engineer" means nothing here. The expenditures of technical education should not be reflected in the professional "designation" of the graduate.

I am convinced that an engineering diploma should, as before, be issued to all people who have completed a technical VUZ (even if for some it is an advance). Otherwise it would be possible for us to obtain another kind of training without leave from production in addition the evening form of secondary and higher education. Would this fantasy not be transformed into a formality?

Let us look more attentively at the proposal to issue various kinds of diplomas. A young person has completed a VTUZ. Having acquired the title of technician and filled with desire and energy to grow and "be established" now in the title of an engineer, he has arrived at the plant's design division. He needs a subject for an engineering project. In the subject matter for efficiency work and invention there are mainly the "eternal" issues on which more than one generation of plant designers and technologists have "sharpened their teeth." The beginner is hardly up to this. Of course, there are also

subjects that are not so very complicated. And this is good if they are in his profile.

In the Uralmash future subject plans for the development of inventions and efficiency proposals for 1981-1985 there are 266 subjects, of which 21 are purely for designers (incidentally, only a few of them have been resolved during the past 5 years). Let us say that with a good influx of active graduates the subjects have been distributed. Where does one get additional ones? Should we establish special positions and form bureaus or a group for "subject provision?"

But let us return to the concerns of the future "engineer." He goes to the manager of the research project for assistance. He has prepared a "fully developed nonthematic" variant of the project. Take it and draw it over again. Here is the first hint of formalism. You say that the manufacture and introduction cannot be formalities. They have been through all of this more than once and it is possible to bypass it if there were objective principles, but they are nowhere to be found. For example, the enterprise is not yet prepared to introduce an innovation because of lack of means or the work has not been coordinated with the technologists or it has not been provided with batching items. Such factors will be in effect in any case: but what if the engineering project is not so far-fetched, and it is his own which he has gained through suffering (from the same book of projects), or if he has "inherited" it. What is there left for the future engineer to do?.... And another thing. The other engineer, with his engineering project, will almost always be "a man from the street" as far as the production is concerned and it will hardly be easy for him to make nonplant parts for his brainchild at the plant. Gradually we will be forced to return to the former formal procedure of defending a project.

What will the new path to becoming an engineer, besides the proposed growth of the prestige of the title, produce on the economic plane? The state will make the expenditures, but will there be an income? While the technician is working on his own project which will give him the right to become an engineer, he is going to work at receiving earnings. But for what, where are his (if he is working as a designer) expected 5-6 pages of output? He will have to work on his project in the evening. But why, if it is also a realistic one? Not everyone is capable of this. Possibly the project worker will be granted an academic leave as today's evening students are. Then it is necessary to have well-thought-out, coordinated measures for "promotion to engineer" at the state level. How much higher a level of qualifications will the specialist who has defended his engineering project have as compared to the person in the same position who has come to work as a technician but who has also actively completed many blueprints with his own hands?

It seems that all this is unrealistic, and unnecessary, since the essence of the matter is not in the title. "Go ahead and call me a pot, but do not put me on the stove."

One More Organization, For and Against

Unfortunately, planning organizations that do not have their own production

base, when carrying out a project "on the side" frequently are concerned about how it does in production. They acquire information about purchased items from advertising brochures and sometimes from outdated catalogues. They can far from always obtain the details with which the plant designer would begin (whether or not a similar item is being produced, whether or not its specifications and sizes have changed). Information about high-grade rolled metal, pipes, and other metals is gleaned, as a rule, from GOST's, but the production workers know that at each enterprise the state standards are in effect with essential limitations. As a result there are endless changes.

It cannot be ruled out that the enterprises which receive technical documentation that originated in the design rooms of the "union of engineers"⁴ proposed by E. A. Melnikov would end up in the same unenviable position. And this will not do. Here are both additional expenditures and useless labor (plant designers are taken away from their basic work in order to redo other work) and correspondence with manufacturers of purchased items (requesting that they confirm manufacture and clarify the sizes). In a word, one cannot get away from trouble from "others'" blueprints.

A creative brigade from such a union has completed its work, been paid, and disbanded. But what does it mean "to complete its work"? The project has been carried out, but to what stage, to what element? To what part? In the example given by E. A. Melnikov the members of the brigade play the role of project designers (they create blueprints of an enterprise), that is, they do what is ordinarily handled by an all-union "gipro." But who develops the actual equipment which will be installed in the projected enterprise and who will embody it in metal? The "union of engineers" will hardly have its own production base (not an experimental one). It is impossible to embrace the unembraceable. Such a base would have to be extremely large and universal, for it would have to carry out the developments of specialists "of all profiles." Today, for instance, a unique dredge is being made, tomorrow a loom is being assembled, and next in line is a modern computer. If there is no base, "for which" enterprise will the project be created and how will the manufacture be coordinated with the production plans?

E. A. Melnikov writes that it suddenly occurs to one of the members of the brigade to utilize an acoustic radiator.⁵ The idea is taken up and it is subsequently explained that series-produced radiators are either not very powerful or they are not for this particular purpose. The plant which could make the necessary design on the basis of branch specialization, unfortunately, does not have the necessary equipment. It can only be imported and this requires time. But let us say that a manufacturer has been found. It cannot be ruled out that the documentation developed by the brigade does not correspond to its "style," and it will be necessary to have additional concerns about fitting the project in. Will the "union of engineers" pay for this work? This is not an extreme but a reality. One can think up whatever one wishes.

Workers of the "union of engineers" do not know enough about the production capabilities of the enterprises throughout the country in order to manage the whole business. It is also necessary to have confidence in the fact that the projected machine will be produced at exactly the selected enterprise and in

their required time periods. This means delving into the sphere of planning and organization of production. It is necessary to know the STP of each enterprise (that is, the "shells" of items from the GOST's which are in operation there), and its ties and capabilities along the line of supplies. For example, it is easy for Uralmash to acquire a pipe 140 millimeters in diameter even though for the given conventional use it would be more economical to use a pipe 133 millimeters in diameter which are "delivered" by Yuzhuralmashzavod and the Alma-Ata Heavy Machine-Building Plant. This is the way ties have arranged themselves with the suppliers. Will workers of the union be able to catch all these fine points? It cannot be ruled out that the brigade will take the easy path--take what is "easier" and "closer." And it will waste what the manufacturer has made. If they have in mind that the brigade will begin to produce only ideas, bases for the future technical process, then we have plenty of these "idea men" in all the local areas. As a rule, their ideas take off and land on plant soil.

In my opinion, a "union of engineers" in the form proposed by E. A. Melnikov cannot work and will not survive. But there is a grain of reason here--technical consultations. While risking a similar criticism of me from specialists, I shall make a suggestion: it is necessary to have a consultation union or association, a society of technical consultants (it is not a matter of names). Its members should be fully informed in the branch, which will subsidize it, and also in associated branches, and it will be given broad authority to enter into scientific research institutes and design bureaus of its profile, to feel at home in organizations for material and technical supply and standardization. Of course it will not be simple to achieve this. This organization should apparently be under the jurisdiction of the USSR State Committee for Science and Technology.

Let us say that at an enterprise they have found out about a new material for self-lubricating bearings and want to use it. The traditional path under current conditions is exhausting correspondence with the creators, the filling out of questionnaires, endless agreements, "volumes of introduction" and calculations of the expected economic effect for the developers, and a multitude of other factors that take people away from the innovation.

How will the situation change in the future? The enterprise calls in a technical consultant who is fully abreast of things. He figures out the conditions for their work, evaluates the economic advantage and the shortage of new material, and proposes a concrete solution. Additionally, under his leadership (and possibly with his participation) the client creates blueprints for the new bearings. Now it is a matter of introduction. And all this takes place in a short period of time. According to the results of the work they settle accounts. The consultant will help to determine the optimal direction for the development and will advise how to plan and for what technology in the future. Having access to an ideal information supply, he can arrive at an enterprise of his branch without being called, call on a designer and inform him of innovations which would be desirable to use in developments. A good support for the consultants would be an all-union information bank of technologies, and the division for interbranch technologies and design materials of the USSR State Committee for Science and Technology in conjunction with certain scientific research institutes could take the

initiative for creating this.⁶

FOOTNOTES

1. Trushkin, V. P., "Zapiski konstruktora" [Notes of a Designer], Moscow, "Moskovskiy rabochiy", 1981, p 215.
2. The task of this group is to be the connecting link between the designers and production in cases when commercial services are not available. For instance, the suppliers have not delivered metal of the necessary thickness and the order is already in the shop. In such a situation the workers of the "replacement group" has the right to make changes in "another's" design, sometimes without the agreement of the authors of the blueprints.
3. "Tekhnicheskiye i esteticheskiye osnovy NOT" [Technical and Aesthetic Foundations of Scientific Organization of Labor], Moscow, 1967, p 97.
4. Melnikov, E. A., "The Engineering Vacuum," EKO, No 10, 1985.
5. Uralmash worked with a similar item, intending to use it in a filter for purifying rolled metal emulsions. Not a single specialized plant would agree to make the necessary element.
6. Bulletin NIR: PROBLEMY I RESHENIYA, 28 May-10 June, 1985, pp 3-4.

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FALSE SAVINGS OF MONEY REVEALED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 128-132

[Article by M. A. Shimanovich, candidate of technical sciences, Moscow Machine Tool and Instrument Institute: "The Cheaper It Is, the More It Costs"]

[Text] In the old machine building plant, rich in traditions, in the assembly shop in a section of 10 workers the greatest earnings were of 520 rubles obtained by the fitter who diligently and skillfully did the scraping, a labor-intensive manual job, and 360 rubles were paid to another fitter for less skillful scraping. The same amount is earned by a good assembler. The minimum amount of earnings in the section is 180 rubles and it is received by a newcomer who is not yet as well trained as the rest.

The best designers of the plant who are not holding administrative posts receive a salary of up to 175 rubles plus irregular bonuses of 20-30 percent of the salary. Among them are those who create unique machines and devices at the level of inventions which do not require scraping and, moreover, eliminate it and other heavy manual jobs in the manufacture of other machines. For a strong designer who holds the position of chief of a design bureau or deputy head designer the salary is raised to 180-220 rubles, and he is given a number of additional administrative concerns which impede the utilization of his talent as a designer.

In a consolidated design bureau of a large plant they did an expert self-evaluation and established that only 20 percent of the designers were capable of developing a simple part independently, and 10 percent of them could produce a blueprint for a complicated part or design a simple component, and 5 percent of them could design a complicated part or a simple machine. And only two designers were capable of providing guidance for the design of a more or less original machine. Thus only one-fifth of the personnel registered in the design bureau could independently (without supervision) perform primitive professional work.

There is a critical shortage of capable designers, and the constantly expanding staff lists of design bureaus are taken up by "fillers": educated and semieducated people who are willing to perform design work for low wages. Because here is neither dusty nor noisy nor cold nor hot, nor is there a heavy

physical load. This attracts women, young people who are physically weak, youth who are studying in the evenings or by correspondence, and semi-dependents who, although they are working, are actually being supported by their parents. Talent people who know their worth either leave the design bureaus or never go there in the first place. They prefer places where it is possible to earn more. As a rule, these are bottlenecks in production, its final stages: assembly, adjustment and installation. It is precisely here that critical situations most frequently arise because of the "rush" (for many reasons) nature of production. And here one frequently encounters a situation where the machine adjuster (his earnings are usually 300-600 rubles) is a much more intelligent, knowledgeable and vitally thinking person than the head designer of the machine (his earnings are one-half to one-third as much).

There is now a bottleneck in the assembly shop because the design bureau is working poorly. The higher the level of design of the item, the less the expenditures of labor and time on its manufacture. The ratio between expenditures and effect depends on the ability of the designer to foresee and take into account during designing the processes of manufacture and operation. What can even the most skillful adjuster do in the assembly shop with an unintelligible design that is filled with mistakes? For at the price of great expenditures of time, labor and money, it has somehow been produced and pushed through the gates of the plant for further torment of the operation workers.

It does not require a lot of "designers" in order to eliminate such designs; one needs a few "Designers. We have more than enough ordinary "designers"; they are spread far and wide. Aspects of specialists of manual labor can be found among them. If such a person appears at a plant they try to advance him up the job ladder and do not send him away: who would do the work? He must work not only for himself, but also for the pseudospecialists and with his labor correct their blunders. It is not by accident that the rule exists: it is more advantageous to pay for a vacation for someone who is ignorant and unskilled so that he will not mess up the work.

In today's design facility, unfortunately, the central figure is the routine "designer" who is incapable of carrying out serious tasks. He is "his own" person here, he creates the climate, he sees a knowledgeable specialist as a "foreign body," and he tries to get rid of him, which is accompanied by approximately these words: "Do you need more than anybody else?" or "We have nobody who is irreplaceable here!" He will undertake to carry out any task ("Just give me the money"), turning money into garbage, but asserting that the problem has been solved. And you will be convinced that nobody will be able to do it better and everybody has to utilize the unsuitable solution.

Of course such situations are "intimate" in nature, but they are fairly widespread, and a mechanism has developed which deprives the intelligent specialist, who is looking for the shortest path to a socially useful result, of the force and possibilities of working productively. Either adapt or else, along with everyone else, produce beautiful soap bubbles or you will be cut off from real work.

But what can be done? It is necessary methodically, persistently and with all the forces of the state and society to change the climate in the engineering

facility. First and foremost it is necessary to limit the routine production of "designers": to bring the capacities of the VIUZ's into line with a number of young people capable of engaging in the corresponding activity, and to do a better job of teaching those students who have been admitted to the institute.

It would be good to reduce the number of students per teacher, to reduce his academic load, and to give him the opportunity to work more in production and for production. A higher engineering school should actually be interested in making sure that capable students are taught by capable teachers there. It would also be good if the scientific and practical activity were a part of the work of the educator, and teaching in the VIUZ apart of the scientific and practical activity of the specialist. Thus training would be more firmly linked to science and practice and the students would have the opportunity to apply the ability to think creatively which they have learned from their teachers. The teacher who has never designed a machine himself is capable of teaching the future specialist at best only to imitate the process of designing.

From the working engineers one must look for "needles in a haystack" and give them the opportunity to work to advantage. It is time to learn to judge a designer from the results of his activity and in everything (wages, distribution of housing, places and children's institutions, passes and other benefits) give priority to the intelligent specialist who knows his business well. He is burdened by his basic work and has neither energy nor time for public work. No "objective" indicators will reveal him, nobody will notice him except for an attentive observer who is sincerely interested in success. This is what the head designer must be.

Additionally, a strong designer is not always convenient for the management. He cannot be called complacent, he knows his own price and the price of his solutions, he can "spoil" the indicators, he can demand that "carefully thought out" plans be changed, and he is frequently against things. The "fillers" are always easy-going, they engage actively in public work, and they strive to obtain as many benefits as possible.

Attentive nurturing of creative designers in the plant design bureaus and their creative tempering will make it possible to reduce the bureau's personnel to one-fourth to one-fifth. The plant's design department should become its supply of gold, people who are gathered carefully and painstakingly and used for generating qualitatively new ideas and solutions that are necessary to the plant and to the society as a whole. "Do not look for funds, look for people" among students, scientists, specialists of scientific research institutes, special design bureaus and so forth.

The head designer should be a designer and not an administrator, and he should be assisted by an administrative manager who handles problems of all kinds of support. Moreover, it is necessary for the head designer to determine the technical policy of the plant, that is, he would be the head engineer or the head engineer would be the head designer (and not according to the letter, but in spirit).

In other words it is necessary to have not an administrative, but an economic mechanism for searching for educating and reinforcing with palpable and generous moral and material incentives for people who are real designers and not false ones. Otherwise items will continue to be planned as they are now, so that their production and operation cost the state an unjustifiably large amount of money.

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QUALITY OF ENGINEERS DISTRESSES MANAGER

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 132-135

[Article by Ye. V. Gusev, chief of the ASUP [Automated Plant Control System] Division of the Khimprom Production Association (Usolye-Sibirskoye): "From Personal Observations"]

[Text] Having worked in production for almost 30 years I can see that it is now becoming more and more difficult to find an intelligent engineer who has initiative. Why? I shall try to answer this question mainly on the basis of my own observations.

I started to work in the chemical combine in 1961, in the shop for control and measurement instruments and automation equipment KIPiA), having completed the VUZ. I still recall with a great deal of respect my first shop chief, V. V. Pshenitsin and the head engineer (subsequently, director), F. P. Gutsal. They thought that the KIPiA shop should be responsible for solving all problems of production automation. At that time we had two plans: for repair of instruments and automation of production. The shop included a design bureau for automation of production, an experimental section and a large assembly and adjustment section. A special subdivision for preparing production handled orders and the acquisition of all the materials, instruments and means of automation for assembly and adjustment.

My first position was that of master designer. I was to study an object of automation (technological process, installation and so forth) and develop the necessary technical documentation, and if necessary, with the help of workers of the experimental section, to work out the technical solutions. Then, under my leadership, the brigade of workers of the assembly and adjustment section assembled and adjusted an automation system and turned it over to production in working condition. Since the author of the plan worked right there, he heard the criticism and the good words about him. Omissions and mistakes were eliminated more quickly, experience was accumulated, and the qualifications of the engineer increased. Unfortunately, all of our good undertakings were eliminated in approximately 10 years.

In the first place, there were and still are annual reductions of administrative and management personnel (AUP). According to the provisions of the Ministry of Finance, the foreman of the KIPiA shop was in this category of

workers. We could not reduce the service that handled current repair of instruments. They had a great deal of work and there was no one to eliminate there. The blow was dealt to the services that worked for the future. Some of the foremen were eliminated and some were transferred to the planning and design division (where they were no longer AUP). The engineering and technical personnel of the assembly and adjustment section were reduced to a minimum. That is, there was no longer a unified automation service. As far as I know, now there is not even a plan for automation of production.

I never understood and I probably never will understand such reductions. It is advantageous for every production to have a certain ratio between engineering and technical personnel, on the one hand, and workers, on the other. And perhaps it is not for the Ministry of Finance to judge this. It annually reports on the effect that has been obtained. But is this effect real? Perhaps we are losing a great deal more?

In the second place, at almost any chemical enterprise there are harmful substances in the air and individual shops (and also in the air space of an industrial site). For the regular workers of such a shop benefits have been established (reduced working day, increments to wages, longer vacations, a lower pension age and so forth). If an engineer-designer or a worker of the automation service, because of the nature of his work, finds himself in a shop with harmful conditions, even if he cannot leave he does not receive many benefits. This situation has led to a situation where these workers go directly to the technological shop (they change occupations) or quit and look for normal working conditions where they do not have contact with harmful substances.

I have had occasion to speak with workers of the scientific research institute whose work also involves being in harmful shops. They have similar personnel problems. And this is not an idle question, even including for me. When I came to work at the chemical combine for the first 2 years I was engaged in automation of the shop for ethyl liquids. It had a 4-hour work day. As a worker of the KIPiA shop the management did not permit me to work 4 hours; I worked 8 hours. My vacation was 24 days and not 36, and my medical examination was not every 3 months, but much less frequently, and so forth. It all ended with my going to the hospital after working for 2 years. Then I worked for about 8 years in assembly and adjustment of means of automation in operating chemical shops. And during all these years they thought that I was working in the KIPiA shop, that is, in a shop where there are "normal working conditions." Many of my colleagues (because of the aforementioned reasons) left the automation service during these years. Only the very enthusiastic ones remained.

In the third place, the low wages of engineers, the equalizing in the payment for their labor, and the rare bonuses because the indicators were practically not fulfilled have led to a situation where fewer and fewer young people are entering the VIUZ's and going to production from them. In certain services (planning, the computer center and so forth) they are practically all women. With the existing system of payment for engineering and technical personnel it is difficult to reward initiative or increased skills and labor productivity. In many cases it is much more advantageous to work as a simple worker. The

boys lose their interest in training. I am convinced that the salaries of engineers and masters should be no less than 20-30 percent more than both of the workers under their supervision (except for those who are especially capable). Only then would it be possible to speak about the authority of the master or the engineer. Similar or closely related problems exist at other enterprises as well. And the destiny of engineering and technical personnel and technical progress are tied up with them.

There is the hope that the situation will change with the implementation of the decree of the CPSU Central Committee, the USSR Council of Ministers and the AUCCTU, "On Improving Wages for Scientific Workers, Designers and Technologists in Industry." To be sure, a certain amount of time will be required for this.

One is already tired of hearing the assertion that scientific and technical progress is impossible without the corresponding material base: highly equipped laboratories, experimental installations, experimental sections, corresponding equipment, and so forth. But the problem is being resolved with such difficulty and so slowly! It is reaching a point where anecdotes are being told about it.

In Usolye-Sibirskoye they began to construct a chemical combine and introduced one production after another. But the automation service, without which any modern production is unthinkable, was located in the premises for shoveling coal at an old TETs that was to be closed. To our appeals to the management to strengthen the technical base of the service we always heard the same answer: There is no money, and this frequently came with various "comments" about us. Then through deception (under the guise of physics and chemistry laboratories of one of the productions) the KIPiA shop was nonetheless constructed. I recently read in the local newspaper that at the Ust-Ilim LPK the situation is similar: there is no KIPiA shop....

In 1975 we acquired a computer and placed it "temporarily" in the living premises of the KIPiA shop (they had already been flooded with water seven times). There is no computer center and we do not know when there will be one. The reason is the same--no money. No arguments about how computers need a certain space and special conditions, without which it is impossible to ensure that the machine will work reliably, will produce the desired effect.

Universal computer training has now been proclaimed. I am sometimes invited to speak to schoolchildren about computers and the prospects for their application. Obviously I must show the children the only computer in the city. But where should I take them and what should I say? The largest enterprise in Usolye-Sibirskoye for 10 years has been unable to construct a computer center, not to mention the small ones. What kind of computerization can there be in such a city?

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SHORTAGE OF APPROPRIATE SPECIALISTS REPORTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 136-140

[Article by A. A. Kalugin, deputy chief of the shop for technical parts of the Volgograd Plant for Tractor Parts and Standards: "The Plant Is Waiting for its Specialist"]

[Text] At the Volgograd Tractor Plant on 11 May 1985 there was a general meeting of managers of services and divisions of the plant and leading teachers of the Volgograd Polytechnical Institute. The institute's rector noted that graduates of this VUZ from past years are holding management posts at the plant, beginning with the general director, V. M. Balandin. Nonetheless in recent years the plant has been unwilling to enter into scientific and technical cooperation with the institute (with a few exceptions). The plant workers have complained about the poor quality of training of today's engineers. In particular the department entitled "Machines and Technology of Casting Production" produces mainly female engineers who have a weak theoretical knowledge and no practical skills. In the unanimous opinion of the plant workers and teachers of the institute, this is one of the reasons why casting production is lagging severely behind other subdivisions of the Volgograd Tractor Plant in terms of the level of labor productivity, product quality and working conditions.

The institute does not train specialists in the area of mechanization and automation of machine assembly and warehouse work or interoperational transportation, and therefore in order to solve these problems the plant must maintain about 600 technologists and designers instead of 100-120 specially trained, qualified workers. The work is done, unfortunately, not through ability, but through numbers.

The general conclusion of the meeting was that the quality of training of young specialists on the whole does not satisfy the needs of production in that a graduate of the institute is more deserving of the title of technician. The diploma of an engineer should be given to him only after he has done the corresponding work at the plant. Although, of course, there are also exceptions. It is necessary to single them out and encourage them. And here the grades of examinations far from always serve as a measure of the quality of knowledge and ability.

One cannot forget this story. About 7 years ago a person in the fourth class, Zhuravkov, came to take practical training in our plant. In conjunction with the plant innovators he did design developments for mechanization and automation of auxiliary and transportation operations and help in their introduction. His personal contribution to the creation of new procedures in the plant was so great that he was issued a certificate for the introduction of means of mechanization that was appended to his diploma project. As far as I know this certificate for the defense of a diploma project is an extremely rare phenomenon. In the explanatory note in the blueprints they included Zhuravkov's own developments (also not a very frequent phenomenon). The members of the commission had no questions about the essence of the project itself (they did not have competence in the given specific area). Then they decided to examine the graduate for his knowledge and disciplines covered in the second and third classes. His answers were not without mistakes. The result was a grade of "good." One can understand the bitterness of a student who had selflessly worked on a project for many months. In my opinion, such students should immediately be awarded a diploma of an engineer with a grade of excellent.

Students learn from experience: seeing something like this, many of them for a long time avoided real projects and sometimes they still do. It is so much simpler and easier to find and rewrite a similar project, to copy the plant blueprints, and to utilize prepared technological processes than to become involved in independent work. Formally in the institutes it is recommended that real production problems be included in course and diploma projects. But the methods and the situation are such that this initiative or, rather, duty is in no way encouraged, more often the opposite is done.

In spite of the difficulties with defending their own developments, one or two inquisitive enthusiasts can always be found outside the mainstream. Understanding that training in the institute is more and more removed from real activity, individual students come to the plant to master engineering work during their time free from training and ask to be placed in any work that is not too complicated: "We want to figure out the details of the mechanisms of machine tools and their 'diseases' in a different way than from books." Such graduates, of course, deserve the title of engineer.

Basically the opposite situation is also encountered, in which many good engineers have proved in practice that they qualify for the positions they hold although they do not have engineering diplomas. They have acquired the necessary knowledge independently, through technical literature, exchange of experience, practical work and other ways. They have not gone to the VUZ for various reasons, including because of the conviction that training will take away too much valuable time which can be used to a greater effect for useful work. With the existing system of education there is nothing to refute their ideas. Why not give them the title of engineer after a preliminary verification of their level of knowledge? Hardly anybody could be the worse for this since these specialists, even without their "mortar boards" receive excellent wages which are at least twice the current minimum of the young engineer, and it is not necessary to pay for their training in the institute.

The prestige of the engineer is declining, in my opinion, largely because there is nobody to teach engineering in the VTUZ. I will not be telling any secrets if I say that the institutes avoid getting involved in real projects also because their teachers "have done well bypassing production." And without knowing production the teacher avoids it even more, particularly because he is afraid that the workers will laugh at him because he may not have formulated certain questions correctly. The leadership of the practice for many teachers amounts to distributing students through the personnel division to work as common laborers in working positions which regular workers will not take. In order for it to be of any advantage, the student must be sent to practice in technological or design bureaus. But this is frequently impeded also by the fact that the student receives wages for working directly on a machine tool or an assembly line, and there is no money in the bureaus.

The teachers themselves are improving little in their acquisition of practical skills, and in their scientific activity they prefer mainly narrow theoretical areas which, as a rule, are not coordinated with today's complex plant problems, and they do not like to engage "simply" in the development of technological processes, not to mention designing adaptations for means of automation.

The Ministry of Higher and Secondary Specialized Educations have the goal of training engineers of a broad profile, technologist-designers. How are the training plans changed because of this? A good deal of attention is now being devoted to the mastery of computer equipment, the study of systems for automated planning (SAPR), and teaching almost all students the fundamentals of inventions and methods of engineering creativity. One gets the impression that the main thing in the VTUZ today is for each student to master the system of automated planning and become an inventor. All this looks good only in theory. In reality, with the introduction of these additional courses, there has been a considerable reduction of the number of hours spent on learning the fundamentals of the technology of machine building and the practice of developing technological processes and studying production. The students and their teachers are separated from plant activity even more.

In fact how do they "make" an inventor out of a student? He is given a course of lectures on the basis of a well-known book by G. S. Altshuler, "The Algorithm of Invention" (the teachers give this course under the title "Methods of Engineering Creativity"). In addition to lectures about ways of solving invention problems, the students carry out practical assignments (like improving the iron or the meat cutter). If as a result of a brainstorm, say, there appears a new proposal which, in the opinion of the lecturer, in principle is worthy of attention, the problem is considered to be solved. But this is only an idea which is just as far from being realized as it ever was, even before the so-called solution. But the very term "solution" excites the students. To be sure, this is before the first production practice where they are told to solve the simplest production problem, for example, adhering to a tolerance that is not close or a dimension on a strip with an instrument for processing parts in a vise, a gauge and a micrometer. The majority of students turn out to be helpless, although they have listened to the theory of tolerances and know the calculations for series of sizes. Our plant receives young specialists who have taken courses in programming and SAPR.

Unfortunately they have absolutely none of the engineering knowledge necessary for solving various kinds of plant problems.

It certainly does not follow from the statements that methods of technical creativity, the study of SAPR and so forth are superfluous. They are undoubtedly necessary. But far from everyone needs them just as they do not need a predominance of mathematics beginning in the first course and ending in the last one. These disciplines are necessary to people who will use them in their practical activity. And here again we arrived at the need to distribute the students beginning with the third course in reality and not just on paper, so that after 2 years of general technical training they will begin to prepare for their future job with its problems and tasks.

A variety of a proposal concerning early distribution was the target-intensive training of students (TsIPS). But the problem was that frequently the students of the TsIPS group, having completed the fourth course, as before did not know where they would be working or what actually is done in production. Apparently the main forces of the organizers of these groups go for arranging intensive training of young specialists for work on computers. This is hardly enough.

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GREATER POSSIBILITIES OF ENGINEERING LABOR SUGGESTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 140-143

[Article by P. Ye. Spivak, candidate of economic sciences, Lvov Division of the Institute of Economics of the UkrSSR Academy of Sciences: "Social Reserves of the Labor of the Engineer"]

[Text] A questionnaire of about 540 engineers of the divisions of the head designer and the head technologist of 15 machine-building plants of Lvov, Ternopol and Volynsk oblasts showed that an average of 20 percent of the engineers provide 80 percent of the overall contribution to the development of the enterprise. Only 60 percent of the engineers participate in efficiency work and invention. This number included those specialists who during the past 2 years have submitted at least one efficiency proposal.

This unenviable picture has developed, in particular, because more than half of the specialists of the enterprises that were investigated have a basic education which does not correspond to the nature and content of the work they performed. Of those who were questioned 54.8 percent stated that they have a special lack of engineering knowledge in their specialty. Apparently this is why many enterprises "acquire the fruits of modern technical thought basically from the outside—from related enterprises and scientific organizations, and sometimes even from abroad."¹ More and more frequently one encounters the situation where the activity along the social line compensates for the insignificant output from specialists when performing their immediate job duties.

It would seem that it would be possible to compensate to a certain degree for the shortage of engineering knowledge through the system for increasing qualifications. About 62.7 percent of the engineers questioned noted that they far from always have the opportunity to update and augment their knowledge promptly. Frequently the managers release for training only those workers whose absence would not make much difference at the enterprise. It sometimes happens that the leading specialists do not increase their qualifications for years. But even if an engineer has managed to "break away" to the Institute for Increasing Qualifications this does not guarantee that he will receive full-value retraining. The situation is affected by the shortage of teachers who are specially trained for work in the system for increasing

qualifications, that is, those who have mastered theory and modern methods of training and are very familiar with production, and it is also affected by the weakness or complete lack of a material base for the Institute for Increasing Qualifications.

On the one hand the specialists do not have enough knowledge and their training is weak and, on the other, the knowledge which they do have is used inefficiently. Of the engineers who are questioned 50 percent think that their theoretical potential is utilized by less than half.

The daily labor of specialists is not filled with complicated jobs and functions which require a creative approach. Of course, an engineer cannot go from day to day just giving out ideas and finding important solutions. But the more time he spends in creative research the more completely he is informed in the corresponding sphere and the greater the probability of his generating progressive ideas. The questionnaire showed that 21.7 percent of the engineers have no knowledge at all of the technical and economic specifications of the best world models of products that are in the same category as those produced by their enterprises, and 50.3 percent are only partially informed about them. For workers like these, and this makes up 72 percent, it is most likely to have duplication of results that have already been achieved by someone, but at the price of efforts that are just as great as those required for the initial discovery.

Engineers who are working creatively, as a rule, under any circumstances strive to free up time for true engineering work. It would be good not to impede him in this, but to help him. So many words have already been said about the fact that it is necessary to have a sufficient quantity of engineering performers who relieve the engineers of functions that are not properly theirs! At the enterprises that were investigated, as usual, for every three to five engineers there was only one technician instead of the reverse ratio--1:3. The very evaluation of the activity of the engineer basically had to do with the degree and efficiency of his performance of current duties which are far from having anything to do with engineering but which have become ingrained at many enterprises, and this saps the initiative of the specialists and their readiness to answer for the solutions. In our investigation 35.3 percent of the engineers think that the evaluation of their labor does not correspond to the actual achievements of the workers and 30.9 percent think that there is an unfair distribution of jobs and salaries, while 40.2 percent noted that the distribution of salaries only partially corresponds to the capabilities of the workers and the significance of the work that is performed.

Unless the evaluation of the labor is well arranged bonuses become subjective as well. Workers who have achieved the same results are frequently given different bonuses and one gets the impression that in order to obtain a large bonus, not only the results themselves are important, but also the ability to present them advantageously. The creators of new technical equipment frequently obtain considerably less remuneration than those who are engaged in current economic activity. The average annual remunerations for new technical equipment in the wages of engineering and technical personnel amount to 5-7 percent. Even for management engineering and technical personnel, on whom the

introduction of new technical equipment depends, the proportion of these payments does not exceed 10 percent of all the bonus payments they receive.²

It has long been time to develop a collective description of engineering and technical personnel which contains, for example, such qualities as initiative in acquiring knowledge, experience and information about innovations of science and technology which is based on actual utilization of them, and the ability to conduct goal-directed research and to take risks. Even from this one can determine the real character of the engineer and give him material and moral incentives.

Unfortunately, many managers take too formal an attitude toward moral incentives. It is hardly enough to have five or six traditional orders for the enterprise that are issued on days of celebration. Moreover, everyone is well aware of how these orders are prepared when even the number of candidates "for gratitude" is regulated. This kind of encouragement does not achieve the goal and its efficiency and flexibility are poor. Advanced experience shows that it is necessary to take note of workers individually for successful performance of individual jobs with initiative. It should become a tradition to hold "days of the specialist" for exchanging experience and revealing the best workers and conferring the title "best engineer" in various areas of work, awarding a badge and a certificate and the payment, say, of a personal increment to the salary for the year. All these measures would contribute to a certain degree to increasing the effectiveness of engineering labor.

FOOTNOTES

1. Bubnov, G., "Engineering for the Engineer," PRAVDA, 1 February 1983.
2. Pokrovskiy, V. P., "Novoye v planirovani i stimulirovani nauchno-tehnicheskogo progressa" [News in Planning and Stimulating Scientific and Technical Progress], Moscow, "Ekonomika", 1980, p 58.

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EXCERPTS FROM READERS' LETTERS PRINTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 143-145

[Selection of excerpts from letters and questionnaires prepared by V. Lavrov: "From Readers' Letters"]

[Text] For operating any machines, even the most complicated ones, we need not engineers, but mechanics who are very familiar with their structure, assembly and disassembly. They must be able to perform these jobs well. In our national economy we have distorted the need for engineers. The engineer for rubber and the engineer for fuel—these are simply tally clerks. A lot of laboratory assistants are also "engineers." Everything is being done to increase their wages but it will never happen that the mechanic-technician will receive more than a skilled worker and a real engineer--30-40 percent more than this technician. So far the word "engineer" with all kinds of suffixes to clarify it means a position without any accounting for engineering knowledge....

V. Vedenisov, Chief of the Construction Division of Ukryuzhgiprokommunstroy, Simferopol

When I came to work they immediately told me: "We will give you a bed but we cannot help you at all with your wife and son." And on my orders it is clearly written: "Room," because of the family. For 3 weeks I went to the deputy director for personnel before he signed my application for a room in the dormitory. It is not bad and the three of us can live in it; the room has 18 square meters.... And I like the work.

V. Pyatak, Engineer, Kamensk-Shakhtinskiy

"Equalizing" salaries kills initiative and research and makes the engineer someone who is just putting in his time. It is necessary to pay for labor and not for the hours or days. They must be directly interested in the results of their labor, and these results should be known not at the end of the quarter, when we begin to "divide up the bonus" and think about what this or that engineer has done....

T. Chechulina, Kamensk-Uralskiy

Repair services are in need of engineers. For instance, enterprises of the USSR Ministry of Mineral Fertilizers have modern technical equipment, a considerable proportion of which was purchased abroad, and they are mechanized and automated. But the repair service maintains the traditions of the ancient masters: they make "jewelry" in primitive shops.

O. Oganov, Moscow

I have worked for 10 years as a head technologist and I think that engineers are unfortunate people. They work without any objective evaluation of their labor. The engineer leaves the VUZ economically illiterate and then they do not teach him but only reproach him. There are no courses for increasing qualifications for rank-and-file engineers as there are, for example, for rank-and-file teachers. I have envied them all my life. In 25 years of work nobody has ever told me or showed me how I could work better. This is a problem for most engineer.. We need compulsory retraining.

S. Sitedikova, Biysk

I have to solve many complicated technical problems related to the assimilation of new items and the introduction of new technological processes and new means of automation. And we solve these problems. Perhaps sometimes not as quickly as we would like, but we are making progress. The volume of output for our enterprise is doubled every 5 years without any increase in personnel. And this bothers me less than those problems which will have to be solved when I am left as director: in 7 years I have performed his duties for 12 months. And I was never able to figure out our planning, reporting, financing and material incentives. As a result of the confusion in all of these procedures, it seems to me, certain items lay around in the warehouse while the consumers are experiencing a shortage of others. Our engineering and technical personnel are in no way to blame for the fact that they are regularly deprived of their "progressive bonuses." It is necessary to bring order first of all into planning and other economic services, from the enterprise right up to the USSR Gosplan.

G. Drimukh, Candidate of Technical Sciences, Leningrad

Our management of shops and enterprises changes frequently, but I notice that management methods remain the same. They are not flexible. It is thought that if the person is entrusted with the management point, beginning with the foreman, this means that he is psychologically, organizationally and economically prepared to manage a collective. Yet many leaders have no idea about psychology or scientific organization or economics. They must learn this!

N. Simonko, Former Test Pilot, Worker, Kaunas

Why is new technical equipment "introduced" and not used, and on time? Because engineers are not interested in doing more and better on this technical equipment so that time and everything else will be saved. The engineers are not interested in our doing less work by hand. They will not live any better if they work better....

M. Kunin, Builder, Rostov-on-Don

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ASSOCIATIONS, ENTERPRISES GIVEN MORE INDEPENDENCE, RESPONSIBILITY

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 146-187

[Article by Yu. P. Voronov, candidate of economic sciences: "Complete and Authentic"]

[Text] In the political report of the CPSU Central Committee to the 27th Party Congress a task was set "to decisively expand the boundaries of the independence of associations and enterprises and to increase their responsibility for achieving the highest final results. In order to do this, to change them over to complete cost accounting [khozraschet], self-payment and self-financing, and to make the level of income of the collectives directly dependent on the effectiveness of their work."

A large influx of letters to the editorial staff elicited the article by Professor G. Kh. Popov on the pages of EKO, which continues the series of articles on problems of improving the economic mechanism, including realizing the ideas of complete cost accounting.¹ The letters themselves were written before the 27th Congress, but their authors raise problems which were included at the Congress among those that require the most efficient and radical solution.

G. Kh. Popov formulates the essence of his concept as follows: "We are speaking not about adding to the old cost accounting until it is satisfactory, but an essentially new cost accounting in which the main thing is direct reporting by the cost-accounting unit of the demand of the consumers and stimulation of this unit, depending on the degree of satisfaction of this demand. It is distinguished not by the fact that it has no centralized assignments, but by the new type of these assignments. In complete cost accounting instead of operational administrative mandatory assignments they centrally establish assignments which the cost-accounting unit carries out only to the extent that they are economically advantageous."

The high estimation of the importance of this subject and the many unclear aspects of it evoked in the authors of the responses a desire to continue the discussion. Without discussing this beforehand, A. G. Novinskiy, senior engineer from the city of Zhdanov, and G. I. Rozenblyum, a technical bureau chief from Kazan, both suggested organizing a correspondence "round table," a

reader's conference devoted to problems of complete cost accounting. "Cost accounting is not a fashion, but a nucleus around which improvement of the economic mechanism should be concentrated," writes G. I. Rozenblyum. "The crucial nature of the problem guarantees success"—this is the opinion of A. G. Novinskiy regarding this discussion.

The considerable majority of responses to the article by G. Kh. Popov in our mail had positive opinions, some being simply ecstatic. Thus Yu. P. Bakharev, a head engineer from Moscow, in responding to the EKO questionnaire simply placed next to G. Kh. Popov's name three exclamation points. Excitement was expressed somewhat more thoroughly by V. M. Sokolinskiy, a teacher at the Moscow Financial Institute, L. I. Chirikov, department chief of the Siberian Scientific Research Institute of the Petroleum Industry from Tyumen, and others. S. G. Rozhdestvenskiy, a scientific associate from Orekhovo-Zuyev, writes that the article by G. Kh. Popov is the most complete, convincing and systematic plan in the magazine's publications in recent years. And how do our experts respond to the results of the questionnaire? Of those who were questioned, 46 percent of the production workers and 52 percent of the workers of scientific research institutes, design bureaus and VUZ's considered G. Kh. Popov's article to be the best in the issue.

The Author is Right: It Is Necessary To Develop Advanced Ideas

G. Kh. Popov found the largest number of supporters for his criticism of the current system of cost accounting. The comparison of the current system of cost accounting with the well-known character Fazil Iskander—the "old goat."

The main problems of cost accounting—writes Yu. B. Zholobov from Saratov—originate as a strain on the "seams" of this mechanism such as the conflict between economic independence and administrative coercion. Attempts to solve the problem of improving cost accounting, by leaving the rules of direct influence on the activity of the enterprises unchanged, increase the tension in the mechanism for management and complicate management and administrative relations. "Not to allow administrative busy work, petty favoritism or unjustified regulation of the economic activity of the associations and enterprises," it says in the Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000. But one should not juxtapose the plan to cost accounting independence. It is necessary to find a form of interaction between the lower level and the administrative agency above it. Therefore the mechanism of complete cost accounting should be planned as a mechanism that operates both for strengthening centralization and for stimulating the creativity "from above" and "from below."

Previously in EKO, within the framework of a discussion about enterprisingness, it was said that initiative from below is counterposed with "initiative" from above, mainly in the sphere of norm setting and adjustments of the plan. This interaction was given a negative evaluation. Yu. V. Zholobov looks at this problem from a somewhat different viewpoint. He writes:

Many insist that the performance of centralized assignments be advantageous to the performer. It seems to me that this is trying to knock on an open door. In reality carrying out the directive does not affect the advantage of the performer. The fund-forming indicators stimulate to a greater degree the fulfillment of the assignments "from above" and to a much lesser degree, the satisfaction of the demands of the consumers. It is advantageous for the performer even to "perform" assignments that are known to be impossible. Loyalty for the "higher" unit is frequently enough to obtain an advantageous. Possible losses are compensated for (encouraged!) by adjusting the assignment to the level that is advantageous. As a result, the performer is eliminated from the "competition" with the higher planning unit with respect to organizational successes, for the most reliable factor in obtaining advantage "from above" is a lack of initiative....

Frequent adjustments for the suppliers of the planned commitments for supply at the expense of the interests of the consumers and frequently from "their own" planner weakens the horizontal base of the "triangle" of economic and administrative relations (planner-supplier-consumer) and can "shake it loose" along the vertical.

One must agree with G. Kh. Popov when he says that "changing over to complete cost accounting cannot be limited to the sphere of cost accounting as such." I add that it cannot be limited to a principle whereby the preferential right in disclosing of net income is given to the unit that produces this income. This right will inevitably "push" the planner and the direct management agencies out of the sphere of cost-accounting relations, even out the interests of the cost-accounting units according to the criterion of growth of the production of net income, and leave in "shortage" the diversity of products and services that are produced.

Yu. V. Zholobov touched upon an extremely essential issue—the interrelations in the economy are not only bilateral, and even an apparently independent decision to spend one's own money affects not only the buyer and the seller.

In the opinion of K. A. Agranovich, a docent of the Mordovian State University, the lack of coordination of individual elements of cost accounting is manifested most clearly in the fact that the enterprise has the right to spend large sums of money for certain necessary measures and it is prohibited for other expenditures which are not large but are just as important for the benefit of the car, as a result of which sometimes the effectiveness of the expenditure of hundreds of thousands and millions of rubles decreases.

Many agree with the negative evaluation expressed by G. Kh. Popov regarding the lack of clarity of the envisioned incentives when carrying out the prescriptions of purely administrative management and sanctions for violations as such (the amount of incentives and sanctions usually do not correspond to the significance of the factors that bring them about).

M. I. Koptev from Klaypeda gave a small historical excursion. The economic reform of 1965 pursued the goal of directly determining not all of the activity of the enterprises, but the major part of it—through the basic indicators. For the enterprises this was a recognition of their role in the

management of the country, and the reform was greeted with enthusiasm and hope.

But the authors of the reform were overly cautious and did not eliminate an essential shortcoming of the old system of management, whereby payment was made not according to the final result, but for the fulfillment of the directive assignment. It is not by accident that the Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000 draws attention to providing for a strict dependency between the amounts of funds obtained by the associations and enterprises for the development of production, wages and social problems, on the one hand, and the final results of their economic activity, on the other. And then those who began to try to make their lives easier, neglecting the interests of the state, were not slow in taking advantage of this. Democratism and planning showed its negative side, and too many people understood too quickly that a bonus and gratitude could be obtained not only through self-exertion in labor, but also with a reduced introduction plan and with a good reinforcement of material, labor and financial resources.

Few are responding to the summons to accept more difficult assignments and take on counterplans. The workers are taking an easier path. Subdivisions of the USSR Gosplan and State Committee for Labor and Social Problems are submitting to the encroachment of the economic managers on their higher levels. This takes place fairly simply.

In the first place, it is yesterday's production workers who are working in the ministries and all-union associations, and the better they know the state of affairs in one enterprise or another, its problems and difficulties, the easier it is to talk with them and the easier it is to convince them with "objective" conclusions and arguments. As a result, those whom they know well are given a reduced plan and those whom they don't know are given a higher one, but in the branch as a whole the figures of the USSR Gosplan are met. Thus among the workers they plant the seeds of uncertainty about the future.

In the second place, yesterday's production workers love to punish their successors for the slightest omission or mistake. This has already happened: when you yourself do not participate in making one decision or another then you never make a mistake. Subordinates have adapted to this, and before making a decision they consult with their superiors; a collective decision means collective responsibility which leads to a situation where nobody can be punished.

Not a single one of the additions to the economic reform of 1965 took into account the psychological aspects of the activity of economic leaders, and preference was given to power devices. At one time this was called voluntarism in planning.

In order to get away from this and to make the plans scientifically substantiated, the central departments developed a colossal system of reporting. The staff of administrative and management personnel of the middle and higher levels of management at least doubled. The most powerful management staff "digests" the information that is received, and each one

analyzes it in a way that is advantageous at his level and prepares evidence for arguments. Everything reduces to a simple formula: go ahead and lie, they say, but you will not deceive me because I have all the data about your work and I know your capabilities as well as you do!

And the plans that are established are unbalanced. Instead of the flow of information from below to above, the rights of the management leaders have shifted by at least one level. Many provisions and instructions regarding questions of wages and bonuses can be applied only with the permission of the higher organization. And what kind of a master can one be without rights? Only a bad one. Few can stand the close embraces of the economic instructions in the spirit of the 1930s, which remind them every day that excessive initiative can be punished.

By placing on the managers a multitude of contradictory demands we do not achieve the desired results and we lose good specialists. Some, and this is a majority, having learned several lessons of administrative education begin to respect the instructions and become passive. Others fight for implementation of the production program until they have a heart attack. Both of these are bad.

The large-scale economic experiment that is being conducted at the present time does not completely eradicate the diseases that have manifested themselves. The conditions for forming the wage fund seem to make people take on more difficult plans than they had before and the economic incentive funds of the enterprise have been made dependent on the fulfillment of contractual deliveries. But how are the enterprises of the ministries participating in the experiment in 1984 different from enterprises at other ministries that are operating well? To manage poorly under privileged conditions of material and technical supply means to discredit oneself completely as a manager. Up to this day collectives of enterprises participating in the experiment do not involve themselves in questions of completely utilization of production capital and capacities, and they are very cautious about this. There is a reason for this: there has been no change in the interrelations between the enterprises and production associations, on the one hand, and the higher organizations, on the other, in questions of planning (the degree of substantiation of the plans) or the replacement of directive methods of influence with economic ones. Therefore there are no tendencies toward reduction of the material-intensiveness of products or their production costs, or toward increasing probability and output-capital ratio. The changes and corrections earmarked during the course of the experiment will not improve things unless the enterprises are changed over to complete cost accounting.

An engineer from Kiev, O. Ye. Pushkarev, suggests as a first step along the path to complete cost accounting expanding free residual profit as such so that the corresponding sums (in volume) will be deposited into the budget as payment for funds and tax on wages. The coefficients that determine the amount of payment for funds and labor resources should be established as unified normatives which provide for an equal ratio between profit and the wage fund and also between profit and the value of production capital. With the help of these normatives, in the opinion of O. Ye. Pushkarev, the higher agencies can regulate the level of profitability, but this should be reflected

in prices and not, as is now the case, in simple confiscation into the budget of the differences between the production costs plus deductions into the incentive funds and the price. Here instead of the existing policy of one-time revisions of wholesale prices, O. Ye. Pushkarev suggests introducing freely fluctuating prices which depend on the consumer qualities of the products that are produced. It is suggested that the procedure for general price revisions be retained so as to adjust the differences in profitability.

By selling better-quality products at a higher price the manufacturing enterprise will receive above-plan profit. Other enterprises will also be interested in obtaining above-plan profit and will begin to change over to the new technology for manufacturing products. A growing lack of correspondence between the price of a given product and the average branch production cost for a group of items on the average will be eliminated during a certain revaluation, as a result of which there will be a certain reduction of the wholesale price demanded by the enterprise. Here the ratio between prices of items determined by their consumer qualities will remain: the outdated model will cost half as much as the new one. Enterprises that have changed over to the new technology will continue to obtain above-plan profit, although in an amount that is less than before the revaluation. And enterprises which have not succeeded in restructuring themselves and that continue to produce obsolete products will be forced to cover production outlays from their own profit. In order to avoid losses all enterprises will be forced to change over to the new technology.

O. Ye. Pushkarev's suggestions restored hope in the role of turnover tax as a central means of regulating the economic activity of the enterprises. He thinks that as a result the following situations will appear:

1. The manufacturing enterprise will reach the normative level of profitability and during the transition period either accumulates additional profit or sustains losses, depending on how rapidly it has assimilated the innovation.
2. If the price of the item with improved consumer qualities continues to be high, the sum of the turnover tax transferred to the budget increases.
3. If the amount of the turnover tax does not change the consumer will have a high-quality product at the price paid previously for a similar product of a lower quality.

The proposed system will also operate to produce production costs. Let us say that an enterprise that produces items made of metal has found a method of replacing the metal with a less expensive material, for example, plastic, without changing the consumer qualities of the item. Since the quality has remained the same the price of the item does not change. The lack of correspondence that arises between the reduced average branch production outlays and the wholesale price of the enterprise, which has remained with the former, is eliminated during the next revision of the prices of the group of items for this purpose. As a result of the revaluation there is a reduction of wholesale prices for all items that are included in this group, including metal ones. In the final analysis all manufacturing enterprises will be

forced to change over to the new material. And the enterprises that were first to reduce production outlays will end up with more profit.

O. Ye. Pushkarev raises another level of problems that were only touched upon in G. Kh. Popov's article: the interconnection between complete cost accounting and the introduction of scientific and technical achievements into production. He presents his position as follows:

The reduction of the material-intensiveness, labor-intensiveness and capital-intensiveness of the products takes place as a result of competition among socialist enterprises. Planning thus provides the enterprises with the opportunity to develop production without experiencing difficulties with relation to supply and sales since these difficulties are overcome in the process of drawing up the plan. The indicators of the effectiveness of individual enterprises and the branch are planned only as prognostication.

The amount of profit left at the disposal of the enterprise (hence also the amount of bonuses for the workers) depends essentially on the place the given enterprise occupies in the branch with respect to effectiveness of production. In any competition it is important to provide equal conditions for all participants. Therefore an extremely crucial problem is that of distributing equipment and raw material that are in short supply, credit and so forth. This problem can be made somewhat less crucial by temporarily raising prices for products that are in short supply and increasing interest on credit.

When each enterprise is interested not simply in increasing the effectiveness of production but doing this more rapidly than others, the average branch level of effectiveness should increase relatively rapidly. The development of the branch will be to a significant degree self-development on the basis of initiative from below and with maximum utilization of internal capital under the control of the state, in whose hands the economic levers of management will remain.

Unfortunately, a simplification that the majority of responses have in common is the integration of all national economic control agencies into one category of "state." This shows a lack of definition, at least for the mass reading audience, of the functions of individual departments and agencies.

Managers of enterprises frequently have to think not so much about increasing the output of the necessary products as about fulfilling the plan; not about a truly possible reduction of production costs, but about fulfillment of the plan for reducing production costs; not so much about introducing new technical equipment as about fulfilling the plan for new technical equipment, and so forth. Planning which does not properly rely on initiative from below can end up in the situation of Antaios, who was separated from the earth and therefore lost his strength--continues O. Ye. Pushkarev.

It is suggested that the main criteria for evaluating the work of the enterprise be not various indicators of the fulfillment of the plan, but the overall level of effectiveness which in the scheme of the economic mechanism under consideration is reflected in the amount of profit left at the disposal of the enterprise.

O. Ye. Pushkarev is only one of many who consider profit to be the main criterion of effective management. Here, for example, is how these thoughts are developed by A. Ye. Kharlamov, secretary of the party committee of the Eksperimentalnyy Mine in Magadan Oblast.

Under current conditions for whom (from the worker to the minister) it is advantageous to establish a difficult plant?—he begins with his question. In general in the mail there are many questions of all kinds devoted to problems of cost accounting. This apparently reflects the lack of clarity of many of the principal aspects.

As it turns out, nobody—the reader himself answers the question he asked. At the same time he does not think that planning "from the level achieved" is to blame. The solution does not lie in rejecting this method of planning. The fulfillment of the plan should not be linked to material remuneration—this is A. Ye. Kharlamov's central thesis. A failure to fulfill the plan leads not only to a reduction of wages, but also to a subsequent loss of the best personnel. No indicator can resolve this problem.

The solution lies in paying for the final result and for the enterprise this can only be profit, which reflects all aspects of production activity. The key link has been found—writes A. Ye. Kharlamov—it is profit. But it cannot be planned since then profit would turn into an indicator which would be "made" within accountability. Let us try not to plan profit but to make the earnings of all workers dependent on its amount. Let us reflect, for example, the earnings of the worker, brigade or shop at the percentage of profit. Then it would be advantageous for each one to increase profit and, consequently, there is no point in planning it directly. An increase in profit is advantageous to the national economy and as a result the interests of the individual, the enterprise and the society as a whole coincide.

The state is left with three levers for controlling the development of the national economy.

1. The plan for the products list, which is drawn up taking into account the orders and is accompanied by the conclusion of agreements. Fines will be imposed for failure to fulfill it, which will reduce profit and also reduce the base for calculating wages. Overfulfillment of this plan is possible only with the agreement of the client, which leads to the need to adopt a more difficult plan.
2. Directive establishment of the proportion of profit that goes to pay wages to the workers of the given enterprise.
3. The wholesale price developed by the enterprise itself but coordinated with the State Committee for Prices.

A. Ye. Kharlamov sidesteps the problem of the minimum wage, which is necessary in the system he proposes, even if it is just defining that initial sum of profit with which, according to his idea, stimulation begins. Directing searches for "wages from profit" requires further development and close

coordination with another area which can be called "deductions into the budget--payment for funds."

O. Ye. Pushkarev writes: It is suggested that all deductions from the profit of the enterprise into the budget be made in the form of payment for funds, which creates good prospects for changing over from budget financing to credit. A result of this distribution of profit between the enterprise and the budget should be desire on the part of the enterprise to maximally load existing production capacities, to get rid of surplus equipment, and not to create above-normative supplies.

An extremely large amount of attention was paid to the problem of hidden reserves within the framework of the discussion of complete cost accounting. It is quite gratifying that instead of simple and fruitless discussions of this economic phenomenon the authors give an objective analysis.

A reader A. S. Malyutin from Cheboksary, for example, writes: There is the opinion that a manager who works without reserves is a poor manager. And this is correct. The modern economic mechanism is a complicated and dynamic system. Under the conditions of scientific and technical progress and the constant improvement of the economic mechanism, and this means changes in the conditions for the activity of the enterprises, production reserves become an objective necessity. The availability of reserves makes it possible to efficiently readjust for solving new problems that arise.

As a rule, privileges in providing various benefits are given to large enterprises where a large volume of the output of products is concentrated and, consequently, large volumes of production capital, large numbers of personnel, and a large wage fund. This distribution of priorities leads to a situation where individual directions of scientific and technical progress are frequently disadvantageous if they reduce the volume of resources.

The desire to create reserves has also come about under the influence of the evaluation of the activity of cost-accounting units only in terms of fulfillment of the plan mainly for volume indicators, without taking into account its difficulty. An evaluation according to the fulfillment of the plan can be objective only under the condition that the plans of various cost-accounting units are equally difficult. Until an evaluation of the difficulty of the plans and the actual effectiveness of the work become widespread in the economic mechanism the desire to form reserves will continue to exist: the smaller the plan and the more the resources, the simpler it is to fulfill it.

It is possible to regulate the volume of reserves in several ways:

first, by the creation of a system of incentives for more complete utilization of reserves. We know of the experience of enterprises that encourage more difficult plans which create systems of intraproduction cost accounting directed toward more complete utilization of production reserves;

second, by a change in the system of preferences in the creation of various reserves. There are two large classes of production reserves: of the extensive and intensive type. The first means unutilized production resources

which are formed during the utilization of these resources at a level lower than normative: the reserves of capacities of equipment, production supplies, reserves of numbers of personnel and so forth. Reserves of the second type are a stockpile of organizational and technical measures which make it possible to utilize reserves of the first type more fully;

third, by improving the normative base of planning and evaluation of the activity of cost accounting units. The main requirements placed on the normatives in this case are progressiveness and stability. The normatives should be established at the level of the condition for the operation of enterprises that apply advanced methods of organization of production, labor and management and use modern technological equipment; the system of normatives should be relatively stable in order not to excessively influence the difficulty of the work of the enterprises that are introducing measures of scientific and technical progress. The system of normatives is a key point at which the first two directions for controlling reserves are realized.

Since everything turns out to be related to normatives, A. S. Malyutin speaks of them in greater detail. In addition to planned normatives he singles out evaluation normatives which, in his opinion, are necessary in order to compare the results of the activity of individual cost-accounting systems and, consequently, to differentiate material incentives.

An analysis of experience in evaluating and encouraging more difficult plans and effective work at enterprises of the Ministry of Tractor and Agricultural Machine Building, the Ministry of Chemical Machine Building, and the Ministry of Machine Building for Light and the Food Industry shows that the evaluation normatives can be of two types: normatives of the level of effectiveness of the utilization of production resources and normatives of the change in the effectiveness of production. In addition to this they can be subdivided into normatives of particular indicators of the effectiveness of production and normatives that characterize the cost accounting system as a whole. The idea of these normatives was suggested in the works of I. M. Syroyezhin and G. A. Veqiazaryan.

For evaluation normatives of effectiveness one can use the average values of indicators for the group of cost-accounting systems, the average growth rates, and the levels and changes of indicators for the system of a higher order, their extreme values and so forth. The result of the evaluation will be not a measurement of the absolute effectiveness of production, but a ranking of a number of cost-accounting units.

And so in the discussion of ideas expressed in the article by G. Kh. Popov one can trace a desire to solve the following problems:

how to combine payment for funds with deductions from profit into the material incentive funds;

what planning agencies should do under conditions when the basic units have been changed over to complete cost accounting;

how to characterize most fully that totality of economic levers with which the interests of the enterprises and associations on complete cost accounting will be coordinated with nationwide interests.

There are many problems and, surprisingly, they retained the previous nuance of compromise and "hybridization" discussed by participants in the current economic mechanism.

No, in Principle He Is Wrong

Under the conditions of a free discussion the opponents do not rely on the substantiation of the preceding statements. Among the responses to the article by G. Kh. Popov there were few negative judgments, but there were some and they deserve consideration. One direction issues from a different definition of cost accounting.

Thus I. M. Prikhodko, a docent at Kuban State University, proceeds from the idea that the material basis of cost accounting is comprised of resources that are at the disposal of the enterprises and associations and that cost accounting itself is a system of economic relations that arise in connection with the utilization of these resources. He notes further that cost accounting is called upon to subordinate and adapt the labor activity of individual collectives to the interests of the society. If this were not the case it would be not cost accounting but commercial accounting.

It should be noted that here I. M. Prikhodko is using a distinction that exists in Polish economic terminology where cost accounting and commercial accounting are two terms that coexist in parallel.² There is Cost Accounting I--management of the labor collective with an orientation toward its own interests, and Cost Accounting II--management of the actions of this collective with the help of economic levers in order to coordinate its interests with the interests of the society. The incorrectness of G. Kh. Popov's decision consists, in the opinion of I. M. Prikhodko, in that he considers Cost Accounting I to be the only one that exists. From this follows the imprecise remark of the author to the effect that "expansion of independence has turned out to be a weapon in the hands of workers to reduce planning assignments."

Will the right to select the order contribute to overcoming this shortcomings? A number of readers answer this question in the negative.

G. Kh. Popov did not manage to give recommendations about how to realize this right in practice--writes I. M. Prikhodko. If an enterprise is granted the right to accept or not to accept one order or another, it must also be given the right to resolve independently the issue of determining the assortment of products that are produced depending on the depend for them. If it does not have this right, to right to select the order does not mean anything. A machine tool plant can refuse to accept an order for machine tools with a complicated design, that are labor-intensive, and that require highly skilled workers. It is more advantageous for it to accept machine tools whose production has already been arranged and is less labor-intensive even though the price may be lower. Higher prices can not always cover the expenditures

for rearranging production for a new item. It is impossible to solve the problem of the right to select an order by means of the three types of agreements suggested by G. Kh. Popov and this can have a negative effect on the satisfaction of the demand of the society as a whole.

As for the advantageousness or lack thereof of certain items that give rise to a shortage, this is hardly a consequence of the "frozen prices" that were discussed in the article. In our opinion this most likely the result of planning without knowing the conditions of production or its possibilities, which are composed of many factors: equipment and its condition, the availability of personnel, their qualifications, the experience and preparedness of engineering and technical personnel and, if you wish, the sociopsychological condition of the collective. The ministries and departments in planning take into account only the level that has actually been reached.

I. M. Prikhodkov goes on to draw a conclusion that opposes the judgments of G. Kh. Popov. He thinks that it is necessary to fight against inadequate accounting directly, by strengthening accounting. We shall quote the example he gives.

The enterprises are making immense efforts to draw up plans only so that the ministry will turn them upside down. The idea of planning from below amounts to nothing. The ministries and all-union industrial associations when considering the plans for production submitted by the production associations and enterprises "reshape" them without taking into account the conditions and possibilities. If the material remuneration of the planning workers were made dependent on the quality of the plans that are drawn up (corresponding to the actual production conditions), they would try to study the state of affairs at the enterprises and have a better knowledge of their capabilities.

G. Kh. Popov's calls this approach to evaluating cost accounting economic romanticism. But it is typical of romanticism to idealize reality, and here we are speaking about practical measures that consist in observing established rules of planning from below.

Many statements like "You are the one who is the romantic" had to be left out because they are not productive, but it is worthwhile to establish the positions of the opponents. This will lead to a discussion in the area of mutual reproaches. But at the same time one can also trace a leitmotiv--objection to the freedom to select the order.

If one were to follow G. Kh. Popov's thesis that with complete cost accounting the cost-accounting unit performs centralized assignments only because they are economically advantageous, then there would be no vegetable dishes in the dining room and in the stores there would be no salt, children's footwear and clothing or many other goods--continues I. M. Prikhodkov. Obviously, even with complete cost accounting it is necessary to take into account the existence of various interests (advantages) in time, in ranks and many other factors.

G. Kh. Popov named the mistakes of the "antimERCHANTS." One can add that some of them are assuming the position of lovers of payment in kind, which is much worse. In their counterarguments one can see the opinion that for the consumer spending money is Task No 1, and acquiring the necessary commodity is a side, secondary task.

At some time it can turn out to be disadvantageous for the director to spend his own valuable time (and that of other workers) for fulfilling directions for this same fire emergency. Analogously, it is sometimes "advantageous" for a pedestrian or a driver not to wait for the green light.... The consequences of this understanding of advantage vary--from being slightly started to serious losses for the society.

The priority of a higher rank of interest is quite predictable and cannot be excluded even with ideal organization of management and cost accounting. If one is guided by a different principle, it is necessary to leave all the profit with the enterprise and establish high salaries for all workers. This is economically advantageous to the enterprise and the worker, but this cannot be done (and is not done) because this stands in contradiction to a higher rank of interest. One can agree that the cost-accounting unit performs centralized assignments only because of their economic advantageousness if one keeps in mind first of all the higher rank of economic advantage, namely national economic interests.

G. Kh. Popov wrote about the responsibility of the cost-accounting unit. But, quite unfortunately, this responsibility was represented very narrowly and one-sidedly in the article under discussion. It turns out that it is manifested exclusively in the form of sanctions which only partially compensate for the damages caused to the client. Nothing is said about the responsibility of the cost-accounting unit for more complete satisfaction of the growing needs of the people or for the achievement of the greatest results with the least expenditures in the interests of the society.

The most fundamental objections to G. Kh. Popov were made by those who reproach him for unjustifiably exaggerating the role of commodity and monetary relations under socialism.

The introduction of this kind of complete cost accounting--writes Candidate of Economic Sciences V. A. Gints from Dresden (GDR)--would lead to a free play of prices on the market (with the agreement of the parties involved) and to a return to the random market and anarchy in production whereby the price mechanism is the regulator of production. Such "complete" cost accounting, in our opinion, is unacceptable under the conditions of developed socialism.

A similar viewpoint is held by an engineer from Kherson, S. A. Demanov. In his opinion, under socialism money serves only for purposes of distribution relations and foreign trade. As evidence he "from the article by Academician A. M. Rumentsev (VOPROSY EKONOMIKI, No 7, 1984, p 5): "Members of a socialist society are the co-owners of all means of production and results of common labor, the co-producers of vital goods." Arguing against the opinions of Professor G. Kh. Popov and Academician A. M. Rumentsev, S. A. Demanov makes this direct simplification which they did not express: between co-owners

there can be no accounts. This, of course, is not always the case. There exists both various forms of joint ownership and various systems of accounts within them, and therefore the thesis about co-owners does not remove the questions of forms of cost accounting. Apparently S. A. Demanov understands this since he goes on to write: "Complete cost accounting is needed throughout our economy, and not just in some individual unit, even if this is the most basic unit. It is necessary, beginning with planning, and it should be arranged on a calculation of mutual accounts among labor collectives ahead of time. Cost accounting is not a system within a system, not a method or a lever; it is the socialist economy itself in action.

To consider the essence of complete cost accounting through the system of organization of interrelations between consumer and the producer of material goods through prices (by agreement), in our opinion, is incorrect since the client must agree to prices which frequently do not correspond to recouping his expenditures, and the realization of cost-accounting relations presupposes that the relations are by nature equivalently reimbursable. Consequently, the completeness of cost accounting depends not so much on the organizational parameters of the ties between producer and consumer as on how effective resources of the enterprise are used in the process of the creation of an added product which is necessary for covering all expenditures through internal incomes.

Thus we have had described for us two objective parameters that determine the potential success of complete cost accounting: the organizational structure and the actual degree of effective utilization of the resources of the enterprise. Let us turn now to the material which came from A. V. Buzgalin and A. I. Kolganov, candidates of economic sciences, who work on the faculty of political economics of the economics department of Moscow State University, the same place where Professor G. Kh. Popov works.

Everyone is waiting for the decisive word, radically new and valuable suggestions which would make it possible to refrain from the practice of improving the economic mechanism according to the model of the "Trishkin Kaftan." And here in this atmosphere of expectation and searching, the article by G. Kh. Popov appears, boldly and consistently expressing that about which many people frequently beat around the bush.

After such praise one begins to expect criticism. And, indeed, his colleagues at the University turn out to be consistent opponents of G. Kh. Popov.

The author--write A. V. Buzgalin and A. I. Kolganov--sees only the positive results of the introduction of his suggestions: the increased role of the consumer as a result of the development of enterprisingness and freedom of management and, on the basis of this, more complete satisfaction of the effective demand, better balance in the economy and other prerequisites for increasing effectiveness and also intensifying production.

G. Kh. Popov is not the only one of whom such one-sidedness is typical. One can find many eminent authors who suffer from this. In 1965 they were writing about the merits of the indicator of sales and then "did not notice" those obvious shortcomings of it which they were criticizing in the middle of the

1970's, when giving evidence for the advantages of net output, but again "forgetting" about those problems which these same economists are so enthusiastically disclosing today.

Let us turn again to the opinion of A. V. Buzgalin and A. I. Kolganov. People who work on this same campus of Moscow University have christened their polemical weapon a game of chance on the pages of the Siberian magazine.

Of the many objections to the system of complete cost accounting we should single out this one: what will the planning agencies do? Their function, of course, should be radically changed. Studying market conditions, the planners will take measures that are oriented toward a future result and spend less time straightening out bottlenecks which can be seen at the current moment.

All This Has Been Or It Already Is

The history of Soviet cost accounting is sketched in broad strokes in G. Kh. Popov's article. There are several catch phrases: cost accounting of the NEP, the 1930's the intention of the reform of 1965. Most of the comparisons involve the 1930's and the 1960's.

The generally accepted opinion was expressed well by the head economist of the Litrybprom Association, N. I. Koptev: "Cost accounting of the first five-year plans was as simple as the economy itself was: a few enterprises received directive instructions from above as to what to do, when and how much, where to get the raw and processed materials, and to whom to give the final products. The country's Gosplan and a few administrative staffs of the enterprises could cope successfully with this task.

The larger our economy became, the more frequently this system of management of the economy began to cause interruptions since even the most intelligent people armed with the latest technical equipment cannot embrace the unembraceable."

But this thesis is not altogether correct. In fact the ideas of complete cost accounting appeared no later than the principles of rigid centralization did. As we know, the basic principles of cost accounting were presented by V. I. Lenin as early as the spring of 1918 in the work entitled "The Next Tasks of Soviet Power" and were reinforced in a decree of the Council of Labor and Defense of 12 August 1921 and the resolution of the XII Congress of the RKP(b) [Russian Communist Party of Bolsheviks] of 25 April 1923. The 1965 reform repeats to a considerable degree the ideas of the Makeyevka Experiment of 1934. Therefore the answer to the question of whether there should be complete cost accounting or not has always been positive. The divergence began only when selecting the ways of changing over to complete cost accounting and when evaluating the possibilities of this changeover.

A considerable proportion of the participants in the discussion expressed their opinion as follows: if all the normative documents of 1965 and 1979 were augmented with remarks and instructions about complete cost accounting it would make no difference how it was realized.

Here we are approaching a question to which it is difficult for opponents of G. Kh. Popov to respond. The proposals he advanced do not envision a gradual changeover to complete cost accounting and he does not discuss, for example, the sequence of measures which could lead to it, and so forth.

The approach suggested by G. Kh. Popov to create a principally new mechanism of cost accounting and not to update the old one, while it is very attractive, is not realistic enough--thinks a docent from the Kuybyshev Planning Institute, A. P. Zhabin. He thinks that any changes in the system of management of the economy are prepared for by the preceding course of its development, in which one should also look for the germs of the new. If one addresses not the general points concerning the need to change over to a new type of cost accounting but the concrete features of this type which are argued for in the article by G. Kh. Popov, we will find a confirmation of what has been said.

In essence, all the units of the proposed system already exist in one degree of development or another in the current economic mechanism. These include direct ties between suppliers and consumers, which strengthen the role of the order in the organization of their interrelations. These also include the dependency of the amount of funds left at the disposal of the enterprises on the final results of their activity. They include, finally, the normative formation of the wage fund, which can be regarded as a transitional stage to the result-residual method, which is currently being applied in a developed form in Bulgaria (EKO, No 8, 1983, pp 160-171).

It is another matter that the level of development of these indicators of "complete" cost accounting differ extremely in the existing economic mechanism: in the theoretical, normative and real aspects. If one takes the current mechanism for management as it is defined by scientific thought and program resolutions of the government regarding questions of economic construction, its differences from the model proposed by G. Kh. Popov turn out to be not very significant. And the normative mechanism defined by existing economic legislation is distinguished from the theoretical one since it is also influenced by the degree of concreteness of our scientific ideas, the degree to which they have been tested in practice, and the level of boldness achieved in legal regulation of economic relations and the methodological support of the processes of planning. Finally, the real mechanism of management differs considerable not only from the theoretical, but also from the normal mechanism. This also gives reason to describe it in the article under consideration as mainly an administrative system of management based on operational commands from above for all parameters of production of the basic economic unit.

A. P. Zhabin thinks that it is necessary to make significant corrections in the functional content of management activity, the organization of self-management of labor collectives, the training of business executives, the policy of filling management positions and so forth. This is essentially a question of well-known requirements for comprehensiveness and system. But being appended not to the theoretical model but to the concrete technology for restructuring the economic mechanism, these requirements cease to be academic principles and acquire practical, working significance.

Since the new economic mechanism and the new type of cost accounting for the basic unit of the economy are not created in a void but grow out of the "old" mechanism and the "old" cost accounting, part of them being retained and part of them being changed, and in some measure also denying them, it would be logical to devote more constant attention to the compatibility of the elements newly introduced into the economic mechanism and its old elements which are being retained. As a rule, it is necessary not only to eliminate what is being replaced, but also to change correspondingly what is being retained. Without following the whole chain of interrelations and without defining the entire sum of necessary changes, one cannot hope for successful working of the new elements.

Thus the introduction of unified normatives for the formation of the wage fund and deductions into the incentive funds of cost accounting units and, in the future, the result-residual method of forming the wage fund and other funds (which is one of the central aspects in G. Kh. Popov's conception) presuppose equal economic conditions for management, above all equal material and technical possibilities. But is this a condition and can it really be provided by any planning and financial measures within the framework of the existing organizational structure of production and management? Obviously not! This requires the integration of small, medium-sized and large enterprises, and their unification into large branch, interbranch and regional complexes. Then they must be transformed into the basic cost-accounting units of the national economy which are capable of taking on full responsibility for satisfying the corresponding demands of the national economy and at the same time providing for equal (in principle) conditions for the social development of all labor collectives. Thus strengthening the actual cost accounting units in the management mechanism requires an essential rearrangement of the organizational structure.

The task of rearranging the organizational structure for the future economic mechanism, obviously, is one of the most crucial current tasks. But A. P. Zhabin thinks that there is a more fundamental, truly scientific goal.

The differences between the real economic mechanism and its theoretical and normative models also comprise the problem of complete cost accounting. It is not that the idea of modern cost accounting is some kind of "hybrid." While concentrating our attention on the theoretical models of the desired economic mechanism we do not attach the proper significance to the process of its development: we do not sufficiently take into account the laws and factors that contribute to and impede this development. In a word, we are approaching the transformation of the economic mechanism most frequently not as a complicated sociohistorical process but as a fairly simple--in terms of technology--redivision of some kind of actual "mechanism," attaching to this metaphorical term almost a literal meaning. As a result we have good theoretical structures of the economic mechanism which promise a high level of effectiveness and a real mechanism that differs essentially from them.

A. P. Zhabin's opinion is augmented well by the viewpoint of I. M. Prikhodko: While rejecting attempts to update the old part of cost accounting, G. Kh. Popov at the same time advances the idea of complete cost accounting as a new

idea. But this idea is not new. It was defined by the decree of the Plenum of the CPSU Central Committee of 29 September 1965, "On Improving Management of Industry, Perfecting Planning and Strengthening Economic Incentives for Industrial Production." Why has this idea not been realized in practice in 20 years? From the theoretical standpoint--because various scholars invest various meanings in the concept "complete cost accounting." In our opinion, a substantiated response is provided by Academician A. G. Aganbegyan (the newspaper TRUD, 29 August 1984) when he says that complete cost accounting presupposes the organization of a process of production and its development by the collective of enterprises only as a result of their own accumulations and bank credit, without the receipt of centralized capital investments.

Regarding freedom of selection of the order I. M. Prikhodko thinks that this already exists in the relations of light industry enterprises and trade. The price, to be sure, is basically from the list. For individual kinds of commodities the prices also established according to an agreement. There are not many of these commodities. Trade, taking into account the demand of the population, makes an order, for example, from a leather haberdashery factory for belts made of natural leather, and the factory is not given any natural leather and funds are allotted for a leather substitute for producing the belts. Even with the highest contractual price the factory will not accept the order. The enterprise will refuse the order if the product is labor-intensive and requires the restructuring of production and highly skilled personnel because in order to restructure production it is necessary to have additional funds and equipment, and they do not always exist. Agreement prices do not always cover expenditures on newly created kinds of products.

The very formulation of the "right to select the order" means the manifestation of an arbitrary decision and ignoring the objective need to subordinate the interests of the collectives producing commodities to the interests of the society.

The "right to select the order" can be, in our opinion, a means of influencing demand for production under conditions of free trade in means of production. Let us say that a producer of consumer goods has the opportunity to meet the client, the trade base, halfway and produce products that are in increased demand at a price that is agreed upon without centralized regulation, but this leads to inflation of prices in retail trade. A variant of the agreement which presupposes the interaction of two or three economic units is nothing other than good intentions. With a planned system there is a chain reaction of changes in the plans. One wishes to add that even now this happens fairly regularly.

K. A. Agranovich selects one of the purely economic aspects for continuing the discussion: the proposed system of complete cost accounting does not envision a factorial analysis of the formation of net output so as to single out the services of the enterprise for which it should receive incentives. Only factorial analysis can correctly determine the enterprise's share of the net output.

For a long time the indicator of production cost was a calculated indicator. Certain economists considered this situation to be completely acceptable.

"The indicator of production cost remains within the enterprise and for the enterprise. Outside it another economic indicator comes into effect--profit," wrote A. M. Birman in 1966. But not all economists agreed with this opinion, which is shown by a number of articles including the one by the author of these lines, "The Alibi of the Production Cost" (EKONOMICHESKAYA GAZETA, No 2, 1968). In the end, 15 years later, production cost has again become a directive indicator. And in the scheme of complete cost accounting, in spite of the unsuccessful experience with relation to the indicator of production cost, it is envisioned to change over to the category of calculated indicators not only this indicator, but also the indicator of profit. It is our conviction that this measure will not bring us closer to solving the problem of complete cost accounting.

In responses of the type "This has already been the case" they use references not only to domestic, but also to foreign experience.

The system of generalized economic units which utilize freely fluctuating prices of agreements is known in the socialist world--the Yugoslavian economy is based on the same principle: cooperative ownership by production collectives of the means of production limits the authority of centralized leadership, leaving it the possibility of influencing public production only through the economic mechanism (in practice only through credit). The shortcomings of this economic system are known from the experience of Yugoslavia: a higher level of inflation, considerable unemployment, irregularity in the development of various regions of the country--writes our reader S. I. Sladkov from Dnepropetrovsk.

G. Kh. Popov's opponents, A. V. Buzgalin and A. I. Kolganov, also adduce the fact that socialist countries that have changed over to extensive utilization of commodity and monetary relations can now not be proud of high rates of growth in labor productivity or of increased real incomes either. The initial euphoria from an injection of "economic" management has passed, the time has come to bear fruits, but sometimes they are extremely bitter. The temptation that arises to give a new "infusion" is fraught with even more serious consequences. And it seems that all the negative results are linked only to the fact that the dose was too small....

At the same time, the greatest successes in intensification of production among the countries of socialism were achieved by the German Democratic Republic. In its economic mechanism the utilization of commodity and monetary relations is carried out with a dominant role of centralized planning.

The dissatisfaction with the existing "halfway nature" of cost accounting is so universal that it causes many readers to see their way out of this situation in stricter regulation of cost accounting relations. Thus the pensioner economist from Leningrad, A. M. Simonovich, considers it necessary to make the basic means of cost accounting the plan for organizational and technical measures (OTM).

The basic task of the enterprise--he writes--consists in providing for fulfillment within the established time period of the plans for the products and the plan for contractual deliveries of products to the client, observing

the proper quality of products and the conditions for economizing on labor, material, energy and financial resources, that is, operating on the basis of cost accounting and self-repayment. How can this task be carried out? As a result of increasing the volume of production, broadening the assortment and varying the proportional labor-intensiveness at the enterprise or in the association there forms an intrashop or intraproduction disproportion of the loading of technical equipment for individual types of machines. It is possible to reduce the labor-intensiveness of items for those types of machines on which disproportions have formed and achieve uniform loading of equipment only through design, technological and organizational measures.

According to A. M. Simonovich, the very plan for OTM is developed through comparing normative indicators with actual ones. In places where the divergences are the greatest the intervention of designers and technologists is planned. This path presupposes bringing NIOKR as close as possible to production. Within large associations they no longer create scientific research institutes or separate design bureaus, but scientific production subdivisions which have their own forces for carrying out the plan for OTM.

In articles on this subject writers discuss the expediency of this form of juncture of NIOKR and production. But as long as debates are in progress life resolves the problem in its own way and even now scientific production complexes are a reality in many associations.

A. M. Simonovich gives an example from the experience of Leningrad enterprises. The Znamya Truda Accessories Construction Production Association began to create comprehensive subdivisions in 1972 and by 1981 there were 11 of them. Each comprehensive subdivision includes the following structural units: planning-design, scientific research, technological, production (shop, section) and mechanic-energy. All the subdivisions are organized on the basis of a single shop with the exception of one complex which encompasses the entire smelting production. This structure of the scientific production complexes creates a unified system for management on the scale of the association and the necessary conditions for revealing internal production reserves.

Thus the decision of which path to take toward complete cost accounting clearly touches upon crucial organizational problems of scientific and technical progress which cannot be put off.

Let us conclude here the list of arguments of the class "that has already been the case" and turn to the question which seems like an individual one only at first glance.

The Will of the Consumer

"To consider the will of the consumer"--this is one thesis of G. Kh. Popov's which none of the authors of the letter could doubt. But how is it implemented? Especially when the dictatorship of the supplier is becoming more and more total. Regardless of how strict the cost accounting of the 1930s mentioned by G. Kh. Popov may have been, under those conditions it was unthinkable for the postal department to determine for itself the rules for

postal dispatchers, and the transportation department, the rules for shipments. But now when you open the newspaper VOZDUSHNYY TRANSPORT you read that Aeroflot dictates its services to you, the consumer: from the need to come to the airport several hours or minutes in advance to the prohibition against shipping thermometers. The dictatorship of the supplier penetrates into the ordinary everyday psychology and frequently we cannot imagine how it would be possible to formulate differently the relations between those who offer the goods or services and the consumer. Even in kolkhoz markets they now trade the way they do in Odessa, and this is out of inertia. The submission of the will of the consumer by the salesman seems to be everywhere. This sociopsychological syndrome has apparently led also to a situation where the role of the consumer in the system of complete cost accounting has become the central theme of the discussion.

The guarantees of G. Kh. Popov concerning the fact that under complete cost accounting the interests of the consumer will be taken into account fully were subjected to especially attentive consideration by the readers. There was no simple opinion regarding this issue. Participants in the discussion adhered to two extreme viewpoints with equal decisiveness. In the opinion of one group of readers, only complete cost accounting can provide for observance of the interests of the consumer. The viewpoint of the other group was that it will be worse than now since under the conditions of complete cost accounting there will be a weakening of the defense of the interests of the consumer on the part of planning agencies and the price--the most powerful instrument of pressure on the consumer--will be placed at the disposal of the supplier.

As a rank-and-file person I am less interested in the plan of the Ministry of Light Industry in billions of rubles than I am in the actual situation in the store. In the large picture the same thing interests the CPSU Central Committee and the USSR Council of Ministers--writes V. N. Grigoryev, a shop chief from Kiev.

Of course our higher management agencies are concerned primarily about the rank-and-file worker. But the objective conditions are such that the actual situation in a clothing store can be affected only through the plan of the Ministry of Light Industry. How to define this plan--in value terms or in terms of a detailed products list--this is the subject of the disputes.

The rhetorical questions asked by A. V. Buzgalin and A. I. Kolganov shift the discussion to a somewhat different plane. Is it possible for the consumers to exert pressure through the price in order to improve product quality under conditions when the market is actually monopolized by a number of the largest economic organizations? Is it realistic to count on progress of production for the purpose of more complete satisfaction of demand if there is a possibility of inflating the price and obtaining the same income without any efforts? A negative answer to these questions is obvious--and not so much theoretically as practically. It was found decades ago by precisely those authors who thought about the possibilities of changing over to "economic" management. A. B. Buzgalin and A. I. Kolganov go on to present the viewpoints of the leading economists of the socialist countries concerning the tendencies toward monopolization in the socialist economy and conclude: it would be naive to assume also that under the conditions of "economic" management state

property in and of itself will save the final consumers from the pressure of the largest producers which concentrate in their own hands a significant mass of particular kinds of products. This pertains to an even greater degree to the production of means of production.

What "economic" methods are proposed as a medicine for monopolism? None. G. Kh. Popov does not intend to "eliminate" it, but only ease it...by administrative measures: to establish higher taxes for monopoly enterprises and use the money obtained this way for the creation of new competitive enterprises. The author has apparently not thought about the fact that his proposal essentially envisions financing from the state budget not so much health competition as more powerful monopolistic associations (although without the formal agreement of the participants in this alliance). For it is precisely the attempt to create competing enterprises, that is, to worsen the market conditions both for the "old" monopolist and for the newly created competitor that is a true means of pushing them onto the simplest path for improving these market conditions--the monopolistic agreement, and this certainly does not lead to free competition of economic subjects with equal rights. No prohibitions will help here: administrative measures, when they do not rely on economic laws (particularly increasing the collectivization of production), but are utilized to counterbalance them, are ineffective. If G. Kh. Popov understood his thesis concerning replacement of administrative methods of management with economic methods in this way, it would be possible to agree with him.

But no, here the proponents of "economic" management are defending willful regulation through taxes (and so forth) which is called upon to impede the processes of concentration and specialization. These fighters against administrative methods and bureaucratism do not want to think about the fact that departmental determination of the proportions between "surplus" and "normal" income, "correct" and "incorrect" profit give rise to the same splashes of subjectivism and protectionism, bribery in direct and indirect forms, which have never been found in a single system that is constructed on "administrative" methods of management.

Of course it is possible to change over to elementary progressive taxation, but this is a rigid destimulation measure: with a "normally" high income there is a direct interest in maintaining the "status quo"--additional profit will go into the budget in any case and the impulse for improvement of production is extinguished.

Another essential thing is that, although formal balancing of production and needs (in this case--effective demand) on the basis of indirect centralized regulation can be achieved completely, this will take place not so much because of improvement of the reproduction structure of the national economy as as a result of the flexibility of prices. Demand is balanced with supply, but this certainly does not mean balance between production and consumption in its physical-substantial form. It is quite possible to maintain the production of a large volume of luxury items while there is a shortage of mass consumer goods. Thus the demand can be completely satisfied because of relatively high and constantly increasing prices. This is confirmed by the practice of price setting under the conditions of indicative regulation and

predominance of individual "monopolists." It is possible to achieve the appearance of a balanced economy as a result of increasing the state debt and increasing indebtedness to developed capitalist countries, that is, a lack of balance in foreign economic ties. By the time, as a result of indirect regulation, we managed to pull one foot out of the ditch and achieve proportionality in one sphere of the economy, our other foot gets stuck and new disproportions arise. In principle the same practice is also typical of departmental control with its bureaucratism and closed, clannish regulation of reproduction.

Such a method of maintaining balance will hardly contribute to increasing effectiveness and changing over to mainly an intensive type of reproduction. And this is one of the problems which is supposed to be solved with the help of "economic" control. But, in the first place, these methods of control do not eliminate disproportions, they simply create the appearance of balance with the help of free movement of prices. In the second place, even if one were to assume that this system would counteract the tendency toward debasing of resources, it creates a new type of losses--artificial "holding on" to products that are in short supply in order to maintain monopolistically high prices. Improbable? But let us recall those losses--which today are not very noticeable--of fresh vegetables, fruits and flowers which were in critically short supply for which the sales people go to the so-called "kolkhoz" market. the flowers wilt and the fruits spoil, and children look at them with wide-open eyes, not understanding why grown people agree to let them go to waste rather than give them to a child. And the parents, receiving their average 186 rubles a month, cannot purchase grapes, 1 kilogram of which costs as much as they earn in 1-2 days.

Examples of this kind are apparent not only to the eyes of the authors of this discussion. They prompt one to think about the existence of a real threat, that the manager of an enterprise that is operating on complete cost accounting will be like the "adult," demand for his automatic rotary line half of someone else's material production fund and wait until the consumer agrees to the proposed conditions. There is no other way to explain the numerous attempts to utilize slightly modernized but fairly customary procedures of control to protect the interests of the consumer.

If there appears a need for some kind of equipment and the consumer enterprises prepared to offer for it a price that is advantageous to the manufacturing enterprise, the manufacturing enterprise has the right to manufacture this equipment for the given consumer without consent from the central departments. Since manufacturing this requires batching items and materials, the production will include a ramified network of industrial enterprises--writes S. I. Sladkov. G. Kh. Popov thinks that complete cost accounting is the only way to fight against shortages, that there are no other ways of increasing the interest of the manufacturing enterprises in constantly updating and improving their products.

S. I. Sladkov does not agree with this and suggests his own variant of forming the portfolio of orders, whereby, in his opinion, the will of the consumer is decisive. He is speaking about orders for machines and equipment.

At the present time the consumer enterprise receives from the planning agencies for technical reequipment measures limits on equipment produced, for example, by enterprises of the Ministry of the Machine Tool and Tool Building Industry. Within the assigned limits the consumer orders from the supplier plant a set of particular models. Thus the consumer gives each supplier the corresponding limits for the machine tools that are ordered and after the machine tool is received, he pays for its cost.

What does it seem to be possible to change in this well-structured system of centralized distribution of funds? But S. I. Sladkov, it seems to me, has found a weak spot in this system and, like a chess player, he has suggested a simple but elegant combination.

Now the amount of the limits and the amount of the monetary funds turned over for the machine tool are equal. It is suggested that the supplier be given limits for the given machine tool which exceed the value of the machine tool. The maximum amount of the possible deviation of the limit from the price of the machine tool is established by the higher organization.

By giving the supplier additional limits the consumer actually refuses orders for this sum from other suppliers. Because of this he is forced to reduce the quantity of initially earmarked measures for technical reequipment, leaving only the most effective of them in the plan. In turn, the supplier enterprise receives funds for material resources and batching items only for the actually ordered quantity of machine tools, and this quantity is manufactured, and additional limits are not pledged.

If a supplier has received more orders than his production capacities can handle (that is, there is a shortage), the following criteria are possible for selecting clients whose orders will be accepted: orders are filled only for those consumers who agree to give the largest volumes of additional limits; or the supplier promises the potential purchasers ahead of time a desirable amount of additional limits for each model of machine tool. Then all consumers who have sufficient limits end up in an equal position, and the list of recipients of machine tools and the times of their deliveries within the group of clients are selected taking into account the priority of the consumer.

The ratio between the amount of received limits and the cost of the products can serve to evaluate the quality of all products produced by the enterprise. This indicator should be the basis for incentives for the entire collective and above all the management personnel--specifically those who take the risk when changing over to new products. This evaluation should be taken into account when solving the problem of occupational growth for people in this group.

The correct functioning of the system of limits presupposes that in the branch as a whole the overall sum of limits should be equal to the production capacities of the branch expressed in rubles. The enterprises that produce equipment which in its parameters does not satisfy the consumers are left without orders and this means without fulfillment of the plan, with all the consequences that ensue from that. Material resources do not go for second-

rate and less effective items. A negligent manufacturer is not simply punished with a fine but is deprived of the opportunity to produce products that are poor from the standpoint of the consumer--he is not allotted resources for this from the system of material and technical supply. The enterprises that manufacture equipment and the scientific research institutes and design bureaus that serve them will be forced to keep up with innovations and inventions, constantly directing their efforts toward the most rapid updating of products, which will provide for intensive development of the economy and the elimination of shortages.

In reality systems of the type proposed by S. I. Sladkov have proved to be good in intraplant cost accounting. A number of enterprises of our country, for example, use coupons for transportation services which were distributed monthly among the production subdivisions--an analogue to the limits proposed by S. I. Sladkov.

"One could joke that every supplier dreams about being the only consumer, while retaining the advantages of the supplier--freedom to maneuver the consumer qualities of his product. But if one is to be serious the enterprises in the role of the supplier would not try to become involved in scientific-technical and economic searches for sources to increase the diversity of the products and services consumed in the economy." It was Yu. V. Zholobov who suggested that this was a situation one could joke about. Hence the question--he continues--if one is to speak about complete cost accounting of the basic unit of the economy, which of them does one have in mind. In my view, complete cost accounting can be that which combines into a single unit three major "figures" of the economy--the planner, the supplier and the consumer--and links the advantage for each of them to his function. G. Kh. Popov suggests linking the interests of the suppliers and the consumers through an agreement that takes into account supply and demand. In other words, limiting intervention from the planner in the evaluation of the final results.

What does the planner get by eliminating the "supplier-consumer" from the relations? Automatic balancing of the effective demand and supply in deliveries. But this balance is achieved because of giving the advantage to the supplier, who acquires additional levers for manifesting independence: the selection of the products list for his deliveries and the selection of the composition of the consumers capable of providing for the greatest increase in his net income.

When there is a sharp difference in the profitability of the products this kind of dual agreement of the planner and the supplier adjusts their interests to increasing the net income and rearranges the structure of production in keeping with this criterion. The interest of the consumer of the products and services is directed toward this: the effectiveness of his work is evaluated according to the ratio between expenditures and results. The interests of the cost-accounting units and the planner, finally, have coincided. All that is left is to decide what to do with those needs which cannot be fit into the framework of the price of supply and demand. How does one force the supplier (no one else is left) to work for these needs? One can agree with G. Kh. Popov's thesis: "There exists a multitude of non-cost accounting levers of

influence on cost-accounting organizations." But is it worth fencing in a fence in order again to restructure the cost-accounting mechanism for the "multiple subject of direct leadership," which is obligatory and inevitable" but suffers from the "multitude of criteria of evaluation" (that is, subjectivism) and must somehow "be regulated...."

It is traditionally thought that the planning agencies are concerned about the interests of the consumer. In the ideas of participants in the discussion this role should gradually shift to the consumer himself, so that he should be the one who is given the necessary means for protecting his own interests.

The function of regulating the activity of the supplier should increasingly be assigned to the consumer--writes Yu. V. Zholobov. The possibilities of accelerated growth of the net income produced by the consumer are formed by the supplier and therefore there is justification for linking the change in the consumer qualities of his products to the growth rates of net income of the consumers. Here the consumer should have the opportunity to regulate the independence of the supplier through influencing the amount of his incentive fund depending on the degree to which the deliveries correspond to his needs.

The planner retains the possibility of regulating the distribution of the net income of the society between the supplier and the consumer through centrally established prices for goods and services and normative fund formations. There is some point in including the difference of the national economic significance of the consumers in the incentives for the selection by the supplier of a priority in their service. The "price of the consumer" can be used for this. The theoretical bases of the system price of the consumer are being developed by the department of economic cybernetics of the Leningrad Financial and Economics Institute imeni N. A. Voznesenskiy.

The last remark of Yu. V. Zholobov brings up the idea of how much has already been done by Soviet economists in the sphere of the theory and practice of cost accounting. And one recalls the words of the Russian economist I. Ammosov, the translator of the works of E. B. Condillac into the Russian language: "One can quite rightly regret that political economics, having as its subject public well-being and, consequently, having greater benefit than all other concepts, is not yet reaching real perfection. Its truths should be just as indisputable as mathematical ones, but still a large number of writers disagree among themselves and, it seems, write with the single goal of refuting one another: as though the matter consisted only in the convictions of the opponents, in spite of whether they are guilty or not." Even from this old-fashioned style one can guess that these lines were written in 1817.

But let us continue.

The economic harm caused by the fact that the limited resources are not distributed and utilized in the best way can be reduced to a minimum--says O. Ye. Pushkarev--if for the consumers of materials that are in short supply we set a price on them which limits the demand to the available supply. Analogously credit can be granted primarily to those enterprises which are prepared to pay the highest interest on it. The consumer can always be best supported by subsidies which he can use at his discretion (for example, for

introducing technology that contributes to economizing on material) which is better than a simple reduction in prices for the materials he acquires. Of course there is the danger than an increment to the price for products that are in short supply will become like a bonus for the manufacturers or their monopoly on production. Therefore it is suggested that the right to establish an increment to the price be given not to the manufacturer and not to the State Committee for Prices, but to the planning agency that is responsible for ensuring the balance of production--the Gosplan. The means whose source is the increment to the price for goods that are in short supply can be directed to the fund for the development of production of the manufacturing enterprise or (partially or even completely) to centralize funds, depending on how the branch proposes to eliminate the shortage of the given products. The selection of the optimal variant of the plan is thus complicated since the variants can differ, particularly in the amount of interest on credit or the amount of the increment to the price for a particular series of items.

Many readers note that complete cost accounting of the basic unit of the economy considerably complicates the work of planning agencies and does not leave them with any of the peaceful activity of those who draw up material balances.

Currently planning of the production of those kinds of products for which a temporary increment to the price is established or for which the period for updating is small should become fairly flexible--continues O. Ye. Pushkarev. The most effective would be continuous planning in which the flexibility of current planning is combined with goal-direction when resolving long-range tasks. The difficulties of planning that are brought about by the dynamic nature of prices will be more than compensated for by the selection of a truly optimal plan. The selection of variants of the development of the enterprise, branch or national economy as a whole is made on the basis of general principles. The price mechanism and the entire structure of economic relations direct the enterprise toward maximum satisfaction of the needs of the society. The interests of the enterprise thus coincide with nationwide interests.

Naturally, with the constantly changing prices it is unthinkable to take into account even the production volumes for the entire list of items. Therefore O. Ye. Pushkarev suggests grouping goods according to the principle of the same purpose. And not only prepared items: the grouping should pertain also to batching components (systems for input or retrieval of information that are suitable for various types of computers). This will stimulate the unification of components that perform the same function in various machines. The varying degrees of advantageousness of the manufacture of items turns out to be not an evil against which it is necessary to fight, but a stimulus for specialization of production. The concentration of production of all products for some particular purpose at one enterprise or in one cost-accounting association is undesirable with the exception of enterprises that are operating for the foreign market. Even under the conditions of socialist management of the economy such concentration could objectively become an obstacle to intensification of production. For the same reason the ministries should not be changed over to cost accounting.

The given classification of industrial items should also be declared unacceptable once and for all. With freely changing prices the very grouping of goods according to purpose must also be continuously changing. Otherwise there will be no end to verbal brainstorms where a regular fretsaw is called a "machine tool for sawing off" and will command three rubles instead of one.

Various consumers can value various properties of one and the same item. An enterprise that has achieved a reduction in production cost is motivated to make sure that its products enter the group of mutually replaceable items whose output at other enterprises involves greater production outlays. And, conversely, an enterprise at which the production cost is higher than the branch average is interested in demonstrating the uniqueness of its product. Apparently it would be expedient to group the items not according to their potential capabilities but according to the needs and the demand they satisfy in given real conditions. Various batches of one and the same commodity can be included in various groups of interchangeable items. Say, for example, a plant manufacturer's metal pipes. Some of the consumers need precisely these and some of them need to use metal ones because the less expensive ceramic ones are unavailable.

When planning production the volume of output of metal pipes which covers the shortage of ceramic ones is included in the group with ceramic pipes, that is, different wholesale prices are planned for different batches of the same pipes. Until the production of the ceramic pipes is arranged, the production of the more costly metal ones to replace them can be maintained with the help of subsidies. This system accelerates the changeover of the manufacturer to inexpensive but durable materials.

The last words of O. Ye. Pushkarev and his predictions regarding the effectiveness of planning work with changing prices can elicit objections. But we should like to draw attention to the following. We suggest, for example, instead of rare price revisions, introducing continuous price changes in keeping with the "law of selection of the order" by each producer enterprise. It is only one suggestion but it turns out to be necessary to change all of the economic mechanism, including changing the functions of the planning agencies.

What is O. Ye. Pushkarev getting at, what problem is he trying to solve? Here it is, the initial aspect. The development of production leads to a situation where the prices need to be changed and regulated while the need to encourage economizing on expenditures demands price stability. As a reader from Moscow, S. T. Boychenko put it, "Dependent attitudes begin with stable prices." According to the proposals of O. Ye. Pushkarev, price regulation is done in such a way that the enterprise by reducing production outlays after the revaluation continues to obtain above-plan profit as a result of reducing the incomes of those enterprises for which the product or technology has become obsolete.

As the level of effectiveness of production is raised the wholesale prices of the products that are produced will decrease. At an enterprise whose effectiveness is maintained at the average branch level the amount of profit will remain unchanged. The volume of products produced can thus increase or

decrease in value terms, depending on the cost of the raw material that is utilized. The volume of products in physical terms can increase or labor productivity can increase, but it can also decrease, and replacing products with more effective ones from the standpoint of the consumer contributes to this. The national economic effect from reducing labor and material expenditures per unit of output can easily be determined quantitatively since a direct time remains between the price and the consumer qualities of the product. When the prices for the consumer remain unchanged, for example, the amount of this effect will be equal to the increase in revenues into the budget from turnover tax when products are sold in the branch.

There, do you get the idea? The picture of an automatically functioning economic mechanism is almost filled in, and everywhere around there is complete cost accounting, and suddenly the questions arises of its own accord: "Why do all this?"

Cost Accounting--The Means. What Is the Goal?

A question that is far from cost accounting--on what should production be oriented, effective demand or needs?--in the responses has become one of the key aspects of cost accounting relations.

At first glance everything seems simple: the goal of management under socialism is to satisfy the needs of the workers. "And everything would indeed be simple if the strategic goals of socioeconomic development under socialism could be equated with the growth of consumption, and the latter--with the satisfaction of effective demand," write A. V. Buzgalin and A. I. Kolganov. They think G. Kh. Popov's thesis that "the effective demand is the main goal and reference point for management, the only form of existence of needs" to be incorrect. "There is no other form today," G. Kh. Popov declared categorically in another one of his articles--in the magazine EKONOMICHESKIYE NAUKI (No 9, 1984). His colleagues at MGU do not agree with this.

The reasons? Dozens of tenets of K. Marx, F. Engels and V. I. Lenin in which the highest goal of the socioeconomic development of the future society was not only complete well-being (it, incidentally, is not equated with satisfaction of the effective demand either), but harmonious, comprehensive development of the individual, the transformation of each into a practical creator of his social life.³ Let us turn to modern works of political economists, philosophers and sociologists who develop these tenets, proving that the goal is not so much utilitarian consumption as the development of the individual in labor, the transformation of this into a need on the basis of practical inclusion of the masses in the management of the economy at all levels, from the collective to the national economy.⁴ Of course, these words can be called romantic discourses. But, as though anticipating this type of objection, G. Kh. Popov's colleagues at his "alma mater" ask a rhetorical question which, of course, is addressed to more than just their opponent: "Is it not for you, respected proponents of 'realistic thinking' that A. and B. Strugatskiy wrote their parable pamphlet 'Predators of the Century'? listen:"

"He swallowed several spoonfuls of salad and muttered:--We know that all great revolutionaries fought for abundance. We do not have the time to theorize

ourselves, but there is no need for that. There are plenty of theories even without us. And then abundance is in no way threatening us. And it will not threaten us for a long time to come. There are much more essential tasks. Dogmatists babble: Abundance is not a goal but a means. We answer that this way: Any means was at one time an end. Today abundance is an end. Only tomorrow, possibly, will it become a means."⁵

Arkadiy and Boris Strugatskiy responded very cleverly to this amateur dialectician: Tomorrow will be too late....

This imaginary dialogue takes place in an imaginary country, and the artistic images are not an argument in a scientific dispute. All this is true. It is also true that in the USSR we have not yet achieved rational norms for the consumption of a number of foodstuffs and industrial goods, that through time is frequently not used for creativity at all, and so forth.

Perhaps it is not so bad that under these conditions before trying to obtain more good commodities and in their free time to produce additional output for the society, obtaining a legitimate income for this? Is it not utopian to orient social progress toward the development of the creative nature of labor, the formation of collective forms of social creativity, and participation in accounting, control, management and education?

No, this is not utopian--say A. V. Buzgalin and A. I. Kolganov. They think that now it has become especially crucial not simply to educate, but to develop through a particular socioeconomic mechanism the reasonable needs of the individual. This is only one component of this mechanism which they single out: the development of needs in labor is a condition for progress which creates material and socioeconomic incentives for labor that are specific for our society. Additionally, the need for labor without any external limitations creates "reasonable" frameworks for the growth of other utilitarian needs. Today the latter, under the influence of randomly inflated consumer standards, is crossing a boundary beyond which consumption becomes a goal in itself.

The "reasonability" of the framework here is given not by administrative compulsion and not by moral and ethical norms, but economically: the new need --a need for free association in labor--in and itself limits the growth of other needs. A person who is employed in any work does not have time or interest to chase after prestigious knickknacks. Are not monetary accumulations a goal in themselves? Let us emphasize: in the USSR there are groups of population whose level of consumption exceeds rational norms. At the same time the majority of members of the society have developed needs which determine the development of the many-sided human personality. Does it make sense today to chase after pseudoneeds?

But yet people are chasing after them! And for an answer to the question about how rational it is one needs a careful analysis of the reasons for this race.

The tasks of harmonious and comprehensive development of the individual presuppose as a necessary component at least a limited (not from outside, not

from compulsion, not from puritan morality, but a need for labor and creativity), but a growth of consumption. But this is principally important: satisfaction of needs certainly cannot be equated with satisfaction of the effective demand. It is possible to increase the volume of consumption in monetary terms and at the same time reduce the degree of satisfaction of many needs that are specific for the communist way of life.

A freely established price cuts off part of the effective demand and thus makes the available supply of goods "sufficient"--write A. V. Buzgalin and A. I. Kolganov--and the development of production is determined not only by the overall volume of the effective demand, but also by its distribution among the groups of the population with various levels of income and the groups of commodities. Necessities are distinguished, as a rule, by a relatively lower price and high labor-intensiveness. At the same time luxury items under the conditions of property differentiation (one of its consequences is increased effective demand of the higher property groups) provides a larger and larger, a more profitable and an expanding market. Because of this various groups of the population acquire various amounts of influence on the market of consumer values. There arises a tendency toward preferential growth of the production of luxury items and items for socially prestigious consumption. This prestige is basically set by the standards and the mode of consumption of developed countries.

Here one cannot but note that these standards are not all bad. Within the Western way of life, which is unacceptable to us in principle, there has formed, for example, the movement of running clubs which is quite worthy of adopting, including the sporting goods, the cross-country races and the comfortable sports clothing. For we want not simply to be different from them in consumption, but to have our own model of consumption that is adequate to the dynamics of a developed socialist society. Simply raising the level of consumption has never been set as a task for the development of the socialist economy. In each stage of the development of the Soviet society and improvement of socialist production relations we have never removed from the agenda the task of comprehensive and harmonious development of the individual or the standards of consumption that are inherent in the socialist way of life.

At the same time, individual negative phenomena in the economy and the sociopsychological orientations of the mass consumer undoubtedly require constant study. Abstract edification changes nothing. A socioeconomic phenomenon will not disappear even because of the most active possible political work--respond A. V. Buzgalin and A. I. Kolganov.

Proponents of the "new" cost accounting think--the authors continue--that unified norms can pertain only to the guaranteed minimum and that the basic part of the income should be formed in direct dependence on...the relationship between supply and demand. This mechanism is certainly not new; it has existed for 4,000 years and is typical of any small (noncapitalist) commodity producer. The income of the worker here depends not so much on the actual expenditures of his individual labor as on the social forces that are behind him--the market. Here one and the same price can conceal colossal differences in individual expenditures of labor and actual assimilation by one commodity

producer of another. Thus labor expenditures during the course of 3 months on the production of early vegetables is exchanged on the kolkhoz market for the labor of a worker over the course of 3 years (the average income from seasonal sale of fresh cucumbers, for example, is \$5,000-\$6,000 rubles, which is approximately equal to the average earnings of a worker in 3 years). Even if one assumes that the private producer works more intensively one can hardly speak of an equivalence of labor expenditures between these two individuals. Yet G. Kh. Popov thinks that the principle of distribution according to labor is realized most fully precisely with an orientation toward demand, with a direct dependency of the income of the worker on the results of the sale of products on the market. The root of this approach lies in equating labor expenditures and price.

Separating producers by augmenting the privileged position of a number of the largest producers and consumers objectively leads to increased differentiation of labor collectives. This differentiation pertains, naturally, not only to the level of income, but also to the content and conditions of labor and its technical support. It originates not so much because of the difference in labor efforts and enterprising as because of the possibility for large, specialized or privileged economic organizations to influence the market and purposefully subordinate the consumer demand to their interests by manipulating the price and the quality of the goods.

In spite of all this the authors of the cited lines are not in favor of returning to rigid administration. Considering management with the help of indirect methods and bureaucratic centralism to be two sides of the same coin--incomplete or partial planning in the organization of production which is carried out by individual economic agencies that are separated from the workers themselves, they write that management exclusively through administrative pressure and leadership on the basis of "economic" levers are equally unacceptable for improving the economy of developed socialism. Having begun a just battle against formalistic planning, departmental prejudices, administrative pressure and bureaucratism, G. Kh. Popov comes to a justification for indirect regulation of the economy that is independent of the workers and is carried out behind their backs.

A. V. Buzgalin and A. I. Kolganov think that complete cost accounting can produce a number of current effects: Short-term animation of the economy brought about by increased activity and enterprising, expansion of the list of fashionable consumer goods, increased volumes of the number of paid services, and so forth.

In the future these effects will be accompanied by negative consequences and, in particular, the reproduction of the status of man as a consumer, the growth of petty bourgeois standards of consumption and the same kind of attitude toward labor and utilization of free time; the predominance in economics of the largest producers and economic organizations that exercise local regulation of economic processes; differentiation (mainly as a result of obtaining "incorrect" profit) of the producers and preservation (expansion) of elements of bureaucratic (that is, separated from the actual control of the masses of the workers) leadership.

But it is precisely these shortcomings that are typical of administrative methods of management!--any proponent of management with the help of "economic levers" will exclaim, and he will be absolutely right. Having retained in directive planning elements of departmental prejudice and bureaucratism and administrative pressure we arrive at such phenomena as local departmental regulation of production, independent of public control and the will of the central agency; inadequate substantiation of material incentives (the "unearned ruble"), which arises as a result of departmental formation of incentive norms; the replacement of the activity of the masses and their creative independence with bureaucratic regulation which degrades the worker to the status of a labor resource and a consumer.

It is paradoxical, is it not? "Economic" management and administrative voluntarism, these two opposing mechanisms, take different paths to one and same socioeconomic consequences and, in spite of all their external dissimilarity, turn out to be two opposite forms of one socioeconomic phenomenon, which from the political and economic standpoint can be classified as partial or incomplete planning. In the first case, it presupposes the predominance of commodity and value forms of economic ties and products ("economic methods"). In the second case, it is a parasite on the planned nature of the national economy, on directive future planning. The difference in the foundations are also conditioned by the difference in methods, but the partial nature of regulation and its subordination to local interests leads to a similarity of the socioeconomic results of these economic systems. This circumstance should be taken into account both by critics of administrative management from positions of "economic" management and by proponents of planned centralism, who rely on the power of the departmental apparatus and administrative authority. The authors see the way out of these contradictions on the middle road--between "complete" cost accounting and administration, and in the development of a qualitative distinction from these two models of a system of organization of economic life. The goal--they write--is a planned mechanism based on universal participation of the workers in centralized planning and management at all levels and in the control of these processes by the masses. Then this mechanism has as a direct goal the creation of conditions for comprehensive development of the individual. We consider it necessary to move toward this step by step. It is impossible to develop the economy further without forming such a mechanism.

A no less unacceptable position in the dilemma of "demand or need" is held by an engineer from Kherson, S. A. Demonov. In the socialist system of management--he writes--we must rely not on demand, but on the reasonable need, social necessity; we must not interfere in the duty of the producers to account for the needs. But S. A. Demonov does not say who shall deal with this as, incidentally, is also the case with many of the other authors of responses.

They quite correctly point out that the interests of the labor collectives cannot consist simply in satisfying demand since this task cannot be separated from the goal of crowding out of the market another producer of the same item. Economic romanticism, thinks a technologist from Gorkiy, G. A. Tetyukhin, can be called not only a hope for centralized accounting for the advantageousness of each item, but also that with free competition on the domestic market the

winner will be the one whose products have the greatest demand. One cannot but agree with G. A. Tetyukhin: the law of supply and demand does not always lead to effective results and under the conditions of a socialist economy it has and will have a limited range of effect. In terms of technically complicated items, large construction objects and so forth in general it is possible to realize in production only one of many variants.

In their letters the readers emphasize the importance of more competition in the sphere of scientific and technical plans on a competitive basis and refer to the rich positive experience in conducting parallel competitive developments in aviation and other leading branches of industry.

There is no doubt that competitions of plans is a necessary procedure for successful realization of the principles of complete cost accounting in practice. But it has a distant relation to interaction between supply and demand, representing some broader system of economic relations.

One of the most basic tasks that was clearly set forth by the 27th CPSU Congress is to strengthen in all ways the anti-expenditure character of our economy, to develop effective anti-expenditure stimuli and, on the whole, to create an effectively operating anti-expenditure mechanism. This task is great not only in terms of direct positive influences on production, but it is also more general than the task of more complete accounting for the law of supply and demand in the process of management of the socialist economy. Complete cost accounting under the conditions of the existing anti-expenditure mechanism is precisely the combination that should exert a favorable influence on the process of acceleration. But if the anti-expenditure stimuli do not work, complete cost accounting will most likely be accompanied by a slight reduction of production costs and an artificial inflation of prices. In the history of the Soviet economy we have already conducted an experiment in introducing complete cost accounting with a lack of an anti-expenditure mechanism when in July 1923 a course was taken toward adopting measures for obtaining the greatest profit, and this played an extremely negative role. These measures were subsequently analyzed in detail and rejected by the 13th Congress of the RKP(b).

During past years the richest experience has been accumulated in transforming the economic mechanism, and this has served as a basis for its further improvement.

In party and government documents a great deal of attention has always been and is being devoted to questions of improving cost accounting. In the report by Comrade N. I. Ryzhkov at the 27th CPSU Congress a task is set "first, to transform the fund for the development of production into the main source of technical reequipment and reconstruction. Second, to conduct a policy so that improvement of housing and other social and domestic conditions for labor collectives will be carried out to a greater degree as a result of the money they have earned. Third, to strengthen the dependency of the wages of each worker on his personal contribution to the final results. Fourth, to completely cut off all channels which make it possible for the inefficiency of some to be concealed through the good results of others. Fifth, to provide for further expansion of the sphere of contractual relations and the strictest

responsibility of enterprises for the fulfillment of their commitments to the consumers. And, finally, which is very important, to put an end to favoritism and infringement by the higher agencies on the legal rights of the labor collectives, and to give them the opportunity to find for themselves the optimal paths for the implementation of plans.

This is precisely what complete cost accounting is.

Our magazine will continue the discussion of problems of complete cost accounting in subsequent articles.

FOOTNOTES

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REGISTRATION OF SCIENTIFIC RESULTS URGED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 188-193

[Article by Ye. L. Belilovskiy, candidate of jurisprudence, B. S. Rozov, doctor of technical sciences (Moscow), and Yu. V. Chetverikov, candidate of economic sciences (Kiev): "Centralized Registration of Scientific Results"]

[Text] The method now being used to evaluate the labor of researchers lack a unified indicator for measuring the volume of scientific output. Indirect ones are used instead: the number of articles, reports and papers, some of which, as practice shows, can have no scientific content at all. Objective evaluation of the innovation of scientific output becomes impossible because of the lack of information about the existence and results of previously conducted scientific research. Frequently publications with repeat research that has already been conducted, that is, that contain no new knowledge, are considered to be scientific works.

In recent years there has been a search for possible methods of evaluating the labor of scholars. We know of a fairly large number of proposals, but in practice they do not go beyond the framework of the currently used mechanism and structure of control of scientific activity. In our opinion, for a more objective evaluation of scientific activity it is necessary to strengthen standardization and centralization. Many traditionally consider this approach to be completely unacceptable for scientific research work. But we suggest using it in relation to scientific activity as such.

As a unit of measurement one should obviously use the scientific result: new reliable knowledge about the surrounding reality, new means and methods of obtaining knowledge, and new ways of utilizing it in practical activity. In general form, the scientific result can be defined as the result of mental labor which has world (absolute) innovation and progressiveness and is intended for utilization as an element in the system of knowledge of the material world and ways of transforming it for more than one object of practical or scientific utilization. V. Ya. Ionaf, relying on this definition and the corresponding list of scientific results (which has been advanced in literature previously) includes among scientific results the statement of problems, methods of research, a scientific fact, systematization, a hypothesis, a theory, an interpretation and a scientific experiment.¹ One

should also take into account other scientific results that are not preserved such as an invention that has no essential distinctions, an organizational normative proposal or a scientific argument.

The requirement of innovation makes it possible to consider the scientific result as a purely scientific product which does not include the products of predecessors. In terms of this quality the scientific result can be a natural measurement with a simultaneous utilization of existing or improved methods of evaluating significance.

As one can see, the concept "scientific results" is extremely broad in volume and therefore it is necessary to differentiate and indicate concretely which type the given scientific result belongs to. Various classifications of scientific results have been proposed, and the most expedient of them can be revealed in the process of practical utilization for each branch of science.

In spite of the diversity of scientific results there is some point in briefly presenting their essence in a uniform formula of the scientific result which is intended to play the same role as that played by formulas for registering discoveries and inventions. The formula for the scientific results should characterize the new scientific content of the result and indicate the area of knowledge to which the scientific result and its type belong. The formula should be brief, standard with respect to terminology, complete and definite. Standard terminology is achieved with standard formulations and common indicators which are used to characterize the corresponding type of scientific result. For completeness of description it is necessary to include in the formula, in addition to general indicators, also particular indicators of the scientific results. The definiteness of the indicators when compiling the formula of the scientific result means that it should not allow arbitrary interpretation and should clearly define the element that is new.

How To Compose the Formula?

First one indicates the area of knowledge to which the scientific result that has been obtained belongs. If the result is at the "juncture" of various areas of knowledge, they indicate all of them. When the existing classifications of these areas are inadequate, it is necessary to propose new ones. A compromise variant is possible: first one indicates the existing branch or subbranch of science and then a more concrete area. After defining the area of knowledge one should give a definition of the type of result.

The nucleus of the formula for the scientific result is the description of the innovation. This part of the formula presents the new scientific knowledge which can be pioneering knowledge or it can be a refinement or augmentation of existing knowledge, which is taken into account when describing the innovation. The pioneering nature is emphasized by the words "for the first time" and for augmentation and refinement of existing knowledge the innovation is given with an indication of distinguishing (additional) indicators as compared to known similar or preceding scientific results.

The authors of the scientific results should include people who have made a contribution to obtaining it under the condition that this contribution is reflected in the formula of the scientific result.

On the basis of such a unified presentation of scientific results it becomes possible in a centralized way, on the scale of the country, to register them according to the results of the expert evaluation for innovation and reliability (usefulness). In this stage there should be a recognition (or nonrecognition) of the result as scientific with a registration of the authorship by specific people and the dates of priority as well as the issuance of a certificate.

The evaluation of the scientific and practical significance of scientific results can be done in a noncentralized way--at the place of production or consumption of the scientific product. Such an evaluation can also be conducted centrally, mainly for the results of highly significant products that are subject to special legal conditions. In this case not a single result should be rejected because, in the opinion of the expert, it is not significant enough. The procedure for evaluating scientific results for innovation, taking into account the proposed new aspects, can have the following appearance. If a scientific result that has been obtained, in the opinion of the authors, meets the requirements set for registration, its formula and description are composed, including the substantiation for the innovation, the reliability and the scientific and practical value. These materials are sent to the center for registration for expert evaluations. For expert evaluation in this stage one must eliminate all unnecessary restrictions and envision a minimum volume of work.

If the expert evaluation for innovation and reliability (usefulness) has produced a positive conclusion, the result is registered and the author is issued a certificate. The formula and (or) the description of the scientific result are published or there is an announcement that a previously published preliminary formula remains in force.

What Will Improve as a Result?

A real possibility appears for creating in all branches of science a unified bank of scientific results, and not only those that fall into the category of inventions and discoveries. This bank will become a reliable and not very cumbersome information basis for scientific research and for control of science. The existence of a bank of scientific results and the utilization of modern methods and means of processing and accumulating information will make it possible to create an effective system of scientific information.

Centralization of expert evaluations of scientific results for innovation and usefulness will make it possible to objectivize this process and eliminate the narrow departmental approach to evaluation and also to make the level of requirements for the results of research uniform for all branches of science. The registration of scientific results will make it possible to construct a legal mechanism for protecting authors' rights to scientific results. The introduction of the author's right to scientific results will help to

effectively determine the social status of the scientific workers, depending on the scientific and practical value of their work.

The possibility of a subjective approach when certifying scientific and scientific-pedagogical personnel will decrease significantly, including the election and reelection to positions, the awarding of scholarly degrees and titles, since the certified people will be able to present certificates of scientific results and their collegial agencies or competent officials will only have to answer the question of the value of these results. It turns out to be possible to simplify the corresponding procedures.

It becomes possible to essentially weaken and partially eliminate control over the process of scientific activity itself, including the utilization of working time.

The changeover to evaluating the activity of scientific workers according to the quantity and quality of scientific results will make it possible to considerably reduce the flow of publications by reducing the number of duplicate publications. It will become possible for editorial staffs to evaluate the innovation of the manuscripts that come in on the basis of the bank of results. A formalized approach to describing scientific results and their classification for various branches of science will considerably increase the information content and the indication of the audience for scientific publications.

Organizational Restructuring

The introduction of the proposed registration of scientific results will require expansion of the centralized functions of state agencies as a result of reducing the volume of other work. In particular, it is necessary to determine who should conduct the expert evaluation and create and operate banks of scientific results. With a centralized approach this should be a sufficiently powerful organization that it is capable of organizing the expert evaluations for all branches of science. Such work is now done by the All-Union Scientific Research Institute of State Patent Expertise (VNIIGTE). This institute, we shall arbitrarily call it the Scientific Research Institute of State Scientific Expertise (NIIGNE), with the help of the broad scientific public and cooperating scientific experts, could carry out the most responsible and, in a certain sense, creative part of the work: to determine the scientific innovation and reliability (usefulness) of the results sent in for expert evaluation.

It will also be necessary to solve many problems of a theoretical and methodological order. For example one can bring up the task that has already been mentioned in literature of developing the basis of the "right to the scientific results" as an independent area of civil law.

At the same time one should warn against excessive skepticism when implementing the proposed measures. One of the tasks of dozens of scientific editorial boards is to conduct expert scientific evaluations of manuscripts that are submitted. This task is now being carried out without a "formula of the scientific result." In most cases such expert evaluation is satisfactory.

It is not the editorial staffs that are to blame for the appearance of duplicate publications, but the lack of a "bank of scientific results" which would make it possible to verify the publications for originality.

The real possibility of expert evaluation of scientific results is also confirmed by the experience in expert evaluation of dissertation work. The need to single out and evaluate scientific results is envisioned in the Provisions Concerning the Awarding of Scientific Degrees and Conferring Scholarly Titles. Meeting these requirements distinguishes the scientific evaluation of dissertations from other kinds of evaluation of scientific products.

Singling out and registering scientific results can essentially change the functions of the system of scientific and technical innovation. There will appear principally new tasks of collecting, storing and processing scientific and scientific-technical information which are more closely linked to control over the utilization of scientific and technical results in the national economy. There will be prerequisites for determining the results for preferential introduction and so forth.

The proposed innovations will allow stage-by-stage changes and additions. For example, even now it would be possible to develop methods for describing the "formula of the scientific result."

Centralized registration of scientific results does not require eliminating existing forms of organization and functioning of science which have justified themselves. The protection of scientific works by authors' rights is also maintained. In and of itself the introduction of centralized registration is only an addition to the existing forms and methods.

But the practice of the functioning of centralized registration can show and, most likely, will show the ineffectiveness of any currently existing mechanisms and procedures and the expediency of replacing them with others that are based on more clear-cut and complete presentation of the scientific results that are achieved. But this is the next stage. At the present time the system of regulation is conceived to be completely compatible with the existing system of control of science as a new constituent part of it.

FOOTNOTE

1. See Ionaf, V. Ya., "Proizvedeniya tvorchestva v grazhdanskom prave" [Creative Works in Civil Law], Moscow, 1972, p 107.

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IMPORTANCE OF MACHINERY RELIABILITY STRESSED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 194-198

[Article by S. G. Stopalov, candidate of technical sciences, State Union Scientific Research Tractor Institute (NATI) (Moscow): "To Whom Is the Reliability of Tractors Advantageous?"]

[Text] The press has repeatedly raised the issue that jobs that are useful to the state should also be advantageous to those who perform them. But this does not always turn out to be the case, and a clear example is work for increasing the reliability of tractors. It is included by the designers, realized at the plant in the process of the production of the tractor, maintained in operation by the machine operators, and restored by workers of repair enterprises.

Increasing the reliability of machines (of course, within certain limits, that is, up to the optimal level) is always advantageous to the state as a whole. The national economic effectiveness of this work, according to calculations of the head scientific research institute, amounts to an average of 8-10 rubles per ruble of expenditures.

The situation is different in industry. Increasing the reliability of tractors requires the application of more costly materials and complicates the technological devices related to solving difficult technical and especially organizational problems. In the final analysis all these measures increase the production cost and the labor-intensiveness of the products, but nobody is actually paid and there is almost no encouragement for this.

Why? There are several reasons.

Reciprocal accounts between the tractor builders and the consumers are kept with the help of payments in addition to the prices of the items and incentive increments. And increase in price (additional payment) is intended to compensate for the plant's expenditures on improving product quality and theoretically should be done every time a useful and effective measure is introduced which improves the quality of the tractor. But in practice the additional payments are made in only less than 30 percent of the cases. The consumer does everything he can to stand in the way of the introduction of the

additional payments. Here is a typical example. A plant representative has tried to apply for a payment in addition to the price of an engine in the amount of 89 kopecks. They laughed at him--this the very small sum of additional payment. And when they had introduced central new measures at the plant and again turned to the consumer for agreement on the amount of the additional payment--now it was considerably more (they responded to him that the measures had not yet been introduced and that they would agree upon the additional payment. Such an answer was nothing other than a direct violation of the law and, of course, the plant protested it and won out. But...they sometimes do not succeed in "beating out" the additional payment.

The consumer also has more serious reasons not to agree to the additional payments. Sometimes the reliability of the tractor is lower than the normative and the consumer says to the plant: "Bring the reliability up to the norm and we will decide on the question of additional payments only when the normatives are met." It would seem that this is fair. But the plant sustains losses from increasing reliability, the more so since the normatives for reliability are revised and made stricter every five-year plan. And it frequently turns out that by the end of the five-year plan the plant has reached the given reliability and can count on an additional payment, but the normatives have become stricter again. And again increasing reliability has ended up in a loss.

The worst enemy of reliability is the normatives for the weight of the designs, labor-intensiveness and cost of manufacture. In order to stay within the set weight a part is sometimes made so much lighter that it becomes unreliable and causes increased expenditure of spare parts. The overall expenditure of metal in the production and operation increases significantly. But the normative for the weight of the tractor is maintained, and the expenditure of spare parts is taken into account according to an altogether different normative which, incidentally, is usually established according to the actual data. The situation is similar with respect to normatives for labor-intensiveness and production cost of tractor-building items.

How then does one arrange it so that the plant does not suffer from increasing the reliability of its tractors? The formula is well-known: every measure that is useful to the consumer should be paid for. And if the reliability is lower than the existing normative, there should be a rebate to the price as is envisioned by the system of certification of products for the two quality categories. When this system is realized in practice increasing reliability ceases to cause harm to the plant and the plant is punished with the ruble for poor reliability.

That has to do with compensation for expenditures. But what about incentives for workers who are responsible for reliability? What comes to the fore here is the incentive increment, a considerable part of which goes for the creation of an economic incentive fund. The increment is usually established when the tractor or engine receives the State Emblem of Quality. It is awarded for the totality of many indicators and not just for reliability. Unpleasant cases arise because of this. Let us say that as a result of the plant's work the reliability of tractors has increased appreciably, surpassing the normatives. The Emblem of Quality has not been awarded because of the cab, which does not

meet the requirements for working conditions. In a real case the introduction of the cab was held up by the lack of the necessary metal, which the Gosplan did not allot to the plant. As a result, a large collective of designers and workers at the plant for several years achieved significant successes, which were confirmed by the consumer, but received no incentives. What do they do with the bonus if they have not added an incentive increment to the price? And it sometimes happens as it did, for example, with the YuMZ-6 tractor. In 5 years it was twice awarded the Emblem of Quality with an incentive increment to the price in an amount of 50 rubles. During this time many useful improvements were introduced on the tractor and it became more reliable. At the next meeting of the commission it was awarded the five-cornered star of honor, and the increment...was reduced to 35 rubles. Thus the incentive fund was reduced by 30 percent. Such "savings" can be very costly.

There is another unsolved problem related to incentive increments. The tractor is made at many plants. Imagine that a plant that makes, say, pistons, has considerably increased their reliability. Who should be given the incentive increment for this? The engine plant or, perhaps, the tractor plant? But they can allot the incentive only if they themselves receive it, and, possibly, things are not going as well for them as they are at the piston plant. Again, the workers who have earned the incentive do not receive it.

For the sake of fairness one must say that small bonuses for increasing reliability are still possible from the centralized bonus fund of the ministry. But these incentives are awarded only to designers and workers of scientific research institutes, and the sum of bonuses is ridiculously small--an average of up to 50 rubles a year. Moreover, even with high results of their work it is difficult to obtain a bonus from the ministry fund: the fund is limited and many people want it.

In principle legitimate paths exist to remuneration of workers in industry for the achievement of high results. But for increasing the reliability of technical equipment, whose basic effect is manifested with the consumer, they do not work. There is no such mechanism.

Awards and state bonuses are not given for high reliability of machines. And they should be. Indeed, what kind of effectiveness can there be, even of the most perfect machine, if it frequently breaks down and stands idle for a large amount of time while being repaired? With low reliability other quality indicators--high capacity, low expenditure of fuel, good maneuverability and so forth--have no special significance since they cannot be fully manifested.

In repair production the interest of the enterprises and individual workers in increasing the reliability of repaired tractors is even less.

Perhaps it would be advantageous for the tractor driver to work to provide for high operational reliability of his tractor? This would require conscientiously taking care of the machine--regularly cleaning the dirt from it and washing the external mechanisms, carrying out technical servicing promptly and completely, changing the oil, being concerned about fueling the tractor with pure fuel and replacing filtering elements, constantly thinking

about acquiring spare parts that wear out rapidly, and performing many more similar jobs.

For this the tractor driver will, of course, receive a certain remuneration--a small share of the repair funds that have been saved. Additionally, working on a reliability tractor he can earn more. But the amount of the additional payment is not great and on the average does not exceed 3-5 percent of his annual earnings. This is explained by the fact that many farms do not follow the rules concerning increments for maintaining technical equipment, their accounting is poor so that it is generally impossible to establish increments fairly, the interest on deductions on the saved funds into the incentive fund is low and, the main thing, is that there is widespread equalizing when calculating wages.

But if the tractor driver does not maintain his machine well and its reliability decreases because of this, only the farm sustains the losses. Not a kopeck will leave the pocket of the negligent worker. And the several dozens of rubles he fails to receive are more than made up for by his working on his farmstead plot.

Most frequently the operators think that the plan produces unreliable tractors. Industrial workers, in turn, blame the machine operators for poor operation. Both reproaches, unfortunately, are justified. But if one looks more deeply into the causes of the inadequate reliability of certain tractors, the technical complexity (improvement of the design of machines and the technology of their manufacture, the quality of materials, the machine tools and equipment that are used, and so forth) recede into the background, leaving first place to socioeconomic questions. An extremely important lever here could be improvement of the system of incentives, which should be based on the price of the item which corresponds to the level of its reliability that is actually achieved.

Providing for reliability requires expenditures and it must be paid for. Work that is advantageous to the state should be advantageous to each worker. A failure to observe this rule is a serious impediment to technical progress.

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DISCIPLINE IN CAPITALIST ENTERPRISES DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 199-207

[Article by Ye. K. Medvedeva, candidate of economic sciences, Scientific Research Institute of Labor (Moscow): "Maintaining Labor Discipline in Capitalist Enterprises"]

[Text] In capitalist enterprises labor discipline is regarded as an important reserve for making profit. As distinct from the socialist economy where discipline serves the goals of forming a communist attitude toward labor and, in the final analysis improving the well-being of the Soviet workers, under capitalism it completely subordinates the worker and becomes a means of increasing exploitation.

In the Western press labor discipline is understood to mean the totality of requirements on the behavior of workers which pertain to various aspects of the labor process. This is not only prompt arrival and departure from work and being present in the workplace, but also the fulfillment of output norms, quality standards, a thrifty attitude toward equipment, and observance of safety rules. To this end methods are developed which provide for unwavering observance of established requirements by personnel.

During the period of existence of capitalism the methods of providing for labor discipline have traveled the path from the book of fines kept by the supervisor to such elegant forms as "bonuses for attendance," flexible work schedules, and various forms of worker participation in the management of production. This certainly does not give evidence of facilitating labor or reducing its intensiveness. Quite to the contrary.

At enterprises of the French automobile company Peugeot, where the average age of the workers is 25 years, half of the young people complain about excessive physical and nervous-psychological loads. The official statistics of developed capitalist countries point to the growth of occupational diseases, accidents and industrial injuries everywhere, and the increased number of people suffering from various psychological disorders. In Sweden just during the past 10 years the number of people forced to leave work because of bad health has doubled.¹

A study of the existing practice of applying methods of providing for labor discipline at capitalist enterprises shows that they are quite varied. In terms of the nature of the influence and the contingency to which they extend, these methods can be subdivided into two basic groups which are used in combination with one another.

The First Group—Repressive-Coercive Measures

These include sanctions against people who have already committed some violation of labor discipline: dismissal from work without pay, transfer to a lower-paying job, fines, withdrawal of bonuses, firing and so forth.

The application of these measures is regulated by legislative acts and provisions of collective agreements concluded between the entrepreneurs and the trade unions. They establish the measure and policy for imposing sanctions. Before the measures are taken the administration of the enterprise is obligated to inform the worker of the violation he has committed and the measures that will ensue from this. In the event that the violation is repeated it usually resorts to dismissal.

As a rule, repressive-coercive measures are used in cases of insubordination to a superior, the worker's appearance at work in an intoxicated state or drinking on the job, the removal of products from the territory of the enterprise for purposes of personal use or sale, regular failure to fulfill output norms and quality standards, and so forth. For example, when the worker fails to fulfill the established output norm his wage rate is reduced by an amount that corresponds to the degree to which he has failed to fulfill it. At the same time he is deprived of his current bonus. With regular failure to fulfill the norms the worker can be transferred to a less skilled category with lower wages, but most frequently he is dismissed.

Collective agreements usually envision material responsibility of the workers for observance of quality standards. According to data of the American Institute of Industry, 64.8 percent of the companies in the United States that were investigated in 1978 subtract defective work caused by the worker from the volume of industrial output, that is, they do not include it in the fulfillment of the output norms. For the worker this means a loss of wages. Moreover, rejected items are usually subject to be corrected either by another worker at the expense of the person who has caused the defects or directly by the guilty party, but without payment.

Fines are widely used for reducing the number of absences because of illness. Striving to reduce expenditures on the labor force, entrepreneurs resort to various tricks. Thus the payment for sick leave is calculated not from the average earnings, but from the smallest part of the, the rate, and it begins not with the first day of the illness, but after a so-called waiting period. If the illness lasts for more than the established period (3-5 days), no payment is made at all. In the event of a lengthy illness the payment is reduced from 80 to 50 percent of the wage rate, depending on the duration of the illness. The worker is thus fined for absence from his workplace even for such a good reason as illness. Frequently the administration requires a confirmation of the diagnosis and appoints a board of specialists who are

prepared to revise the diagnosis and abolish the payment for the sick days at any time.

Repressive-coercive measures are a traditional method of strengthening labor discipline, which was developed at capitalist enterprises as early as the last century. It is quite obvious that the application of this group of measures alone under modern conditions would be inadequate. Of course the administration can fire a worker at any moment, but something else is important—to achieve the most effective utilization of the physical and intellectual capabilities of each of the workers. Solving this problem required that bourgeois specialists revise their ideas about the role of the "human" factor in production. During the past 10-15 years such concepts have been advanced as "humanization of labor," the "quality of labor life," and "industrial democracy" whose authors have recognized that to subordinate the worker to machines, which was done during the period during the growth of mass flow line production, has turned out to be an essential impediment on the path to further growth and increased profits. In their research they have improved the necessity to change the "rigid" style of management of personnel and replace it with a more "democratic" one, which would affect the satisfaction with their labor and the interest of the workers in the results of their labor. According to calculations of specialists, this promised a great advantage and the expenditures were more than recouped as a result of "voluntary" increase in the intensiveness of labor.

The Second Group of Measures—Incentives for Labor Discipline

The incentive measures include various forms of material incentives for workers: bonuses for attendance, lottery drawings, competitions for bonuses, additional vacation and so forth which motivate the workers to observe disciplinary rules. As distinct from repressive-coercive measures, which are regulated by legislation and collective agreements, incentives open up the space for "creative" entrepreneurs and management of companies. Most frequently these measures are used to reduce losses of working time because of absenteeism.

In the statistics of the capitalist countries absenteeism is understood as all failures to appear at work: because of good reason (illness, vacation, performance of special assignments and so forth) and unacceptable reasons (absence without permission, tardiness and so forth). The indicator of absenteeism is calculated as the percentage of the number of days absent in the total number of working days for a particular period (week, month, year). According to data of English specialists, the proportion of unexcused absences in the industry of developed capitalist countries is estimated at an average of from 4-6 percent of the supply of working time and varies from 3.5 percent in the United States to 13.8 percent in Sweden. In France in 1980 there was an average of 21 lost working days per worker per year. The real losses from absenteeism associated with replacement of the absent workers with others are twice as great as the direct ones. The problem of losses of working time is especially crucial in branches where expenditures on labor force exceed half of the production outlays.

Studying the causes of absenteeism is a part of the personnel policy and is carried out by qualified specialists. Certain patterns that are common to all capitalist countries are these: the number of absences is greater for women than for men. This is related to family obligations. For men this depends on sports and entertainment measures. Youth are absent from work more frequently, but for shorter periods of time than are older people. The number of absences decreases as skills and the level of responsibility of the workers increases. Other factors that affect the level of absenteeism are the location of the firm, the operation of transportation, and the organization and conditions for work at the enterprise.

Specialists emphasize that there are not and cannot be any universal methods of fighting against absenteeism from work. In each specific case the program of measures for reducing the number of absences should be based on a detailed analysis of this phenomenon. The so-called bonuses for attendance have become very popular, especially in countries of Western Europe. For example, in Great Britain they are applied by about 30 percent of the industrial companies.

Such incentives can take the form of individual and collective bonuses or a combination of these. In the former case the indicator for the bonus is the attendance of individual workers. Those who have worked an entire week are paid a bonus in the amount of 5-8 percent of the weekly wage rate. In the case of collective bonuses this indicator is the reduction of the overall level of absenteeism in the shop, subdivision or company as a whole. At English enterprises of the American automobile company General Motors in 1980, because of the high level of absenteeism (12 percent) a collective system of bonuses was introduced for high attendance. As a result of cutting the number of absences in half (from 12 to 6 percent) the workers were paid a weekly bonus in the amount of 50 percent of a day's wages.

In certain companies individual and collective forms of bonuses are applied in combination with one another. For example, at enterprises of the Honeywell firm which produces computers, bonuses are initially calculated on the basis of the general plant level of absenteeism and tardiness, and then it is adjusted taking into account the individual attendance of each of the workers. Thus with one day of absence in the week the bonus is reduced by one-third, and for 2 days—two-thirds. With a longer period of absence the worker loses the bonus altogether.

Various kinds of competitions among workers for better observance of work schedules have become widespread. At the end of the year a list of workers is drawn up according to the number of their absences, beginning with those who have the least number of absences and so forth. The bonus fund is distributed as follows: those with the least number of absences obtain 10 percent of the overall bonus fund, and each subsequent group receives 10 percent of the sum that is left.

Another method of providing incentive for workers is to grant them additional days of leave. At automotive plants of the French companies Peugeot and Citroen the additional days of leave are calculated if the overall number of absences during the year is not more than 15 days. The maximum number of

additional days of leave is five. The workers have the right to use these days by combining them with their vacation or accumulating them over a number of years.

Interestingly, two viewpoints have taken form regarding bonuses for regular attendance. Some think this is absurd since there is no direct connection between absence and the results of labor. In the opinion of proponents of this position, the system of bonuses for the minimum absences shows the weakness of the organization of labor and the incapability of the administration to impose labor discipline. The second group of specialists, referring to the positive experience of a number of companies, asserts that awarding bonuses makes it possible actually to reduce the overall level of absences. According to estimates, bonuses of this kind make it possible to reduce absences and tardiness at English enterprises by an average of 2-5 percentage points.

Among the factors in evaluating the labor of workers there are those such as length of service and attendance rate. With a large number of absences in excess of the established limits, the year is not counted in their length of service. Even with favorable indicators for other factors absences can postpone the times for raises and promotions.

Prevention of Violations

In addition to the repressive-coercive and incentive measures for maintaining labor discipline, the administration of capitalist enterprises conducts preventive measures which indirectly prevent violations of labor discipline. This group of measures is an attempt to mitigate the negative consequences of capitalist utilization of the achievements of the scientific and technical revolution. It is manifested in changes in the content and conditions of labor.

Frequently the application of modern technical equipment and technology leads to a reduction of the content of labor, a simplification of the operations, increased monotony and uniformity, as a result of which the general dissatisfaction of the workers growth and the moral climate deteriorates. This is causing serious concern on the part of trade unions. More and more frequently they are making demands for improving working conditions, granting workers social guarantees, and introducing democratic control over production. The threat of social conflicts is forcing monopolistic capital in a number of cases to resort to individual concessions and to introduce programs for increasing the content of labor: expanding functions, rotating jobs and so forth.

Communist and labor parties of capitalist countries as well as trade unions are in favor of the disclosing the essence of modern methods of personnel policy. In a report by J. Marche at the 24th Congress of the Communist Party of France he says: "To think that it is possible to provide for more economic growth under conditions where large capital holds the control levers is absurd."²

A larger and larger number of workers are recognizing their capitalist direction and coming to an understanding of the need for radical social transformations of the society.

FOOTNOTES

1. Zurabyan, K. S., "Rabochiy klass i profsoyuzy skandinavskikh stran v usloviyakh nauchno-tehnicheskoy revolyutsii" [The Working Class and Trade Unions of Scandinavian Countries Under the Conditions of the Scientific and Technical Revolution], Moscow, 1979, p 43.
2. The 24th Congress of the French Communist Party, 1982, p 22.

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MEASURES TAKEN TO IMPROVE HEALTH

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 208-214

[Article by V. I. Billik, candidate of historical sciences, member of the Udelnaya Running Club, and R. G. Sukiasyan, head physician of the Interrayon Medical and Physical Culture Clinic (Leningrad): "For an Effective Policy for Strengthening Health"]

[Text] "To conduct a system of measures for strengthening the health of the Soviet people. To encourage mass development of physical culture and sports and to contribute to introduction of these into daily life everywhere."

—From the Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000

Health is affected by many factors, but the attitude toward it on the part of man himself is an extremely essential one. Usually nobody will argue with this truth. But there is hardly anybody who will transform the rule "your health is in your hands" into a way of life, and in the behavior of the majority of people this is a complex social task.

When speaking about it we will be using the term "vital behavior" (vita = life). This is a synonym for the expression "attitude toward health." By analogy the following concepts are permissible: vital situation, policy, propaganda and problematic.

The basic principles of vital behavior have been known from ancient times. In order to protect, not to mention improve, the health, it is necessary not to violate it, but to strengthen it. The concept of strengthening the health is related to conditions for work, recreation, sleep, the culture of behavior and the culture of nutrition, a negative attitude toward smoking, and personal hygiene. But still most frequently it is equated with physical culture classes. Using methods of physical (meaning also psychological) culture to stimulate natural, including immune and adaptational forces of the organism is inseparably linked to increasing the organization, discipline and initiative of the individual, and this is the most active variable throughout the entire

system of vital behavior. At the same time regular exercises in physical culture and man's interest in them undoubtedly contribute to correct vital behavior in everything else.

The CPSU Central Committee has pointed out the poor effectiveness of the fight against drunkenness and alcoholism and is now implementing a broad program of measures directed toward overcoming this ugly phenomenon in the life of our society. The fight against smoking which, like the consumption of alcohol, is affecting more and more young women, adolescents and even children, is ineffective so far. Unfortunately, the theory and practice of fighting against alcohol and smoking both here and abroad do not sufficiently study and utilize the possibilities of physical culture: to contribute to the creation and strengthening of sociopsychological vital situations for rejecting alcohol and tobacco. Up to this point only scattered data have been published to the effect that regular engagement in physical culture and sports have helped certain people to get rid of harmful habits. But one should speak about the role of the collectives.

In a paper by the committee of experts of the World Health Organization, "Prevention of Coronary Heart Diseases," (Geneva, 1984) it says: "In order to achieve a health level of physical activity in the work of city dwellers and in the way of life in general, there must be a large amount of inventiveness in the education of the population." The role of labor collectives and their managers in developing a correct attitude in people toward health--their own and that of their children and others--can and should increase. In order to have a considerably larger number people than now engage regularly in the necessary amount of physical culture, it is necessary to pay attention both to mass occupations and to individual ones. We are suggesting relatively simple measures that were first conducted by the authors of the article in the Leningrad Club of EKO Readers and were continued in the department of economics of industry of the Finance and Economics Institute imeni N. A. Voznesenskiy and in the Leningrad branch of the Institute of History of the USSR of the USSR Academy of Sciences.

Social-Vital Comparative Express-Examinations

Their main goal was to influence the vital behavior of people. Initially we ask purely informative questions: "Do you know...?", "Do you agree that...?", "Are you prepared to participate...?", and so forth. Then under home conditions the individual keeps log books of his self-control (he is familiarized beforehand with the methods for this). All this ends in an involved conversation during which the results are summed up. Repeated investigations make it possible to compare data on the health condition and the ability to work with the vital behavior and to trace them dynamically.

Express-examinations give an objective picture of the condition of the health of the individual and cause him to think about his way of life. Additionally, these examinations make it possible to obtain initial data for "health passports"--both private and collective.²

We hope that the express-examinations will interest department, organizations and individuals who are engaged in publicizing health. It would be good to

solve the problem of the "health passports" as well. It would be possible to gradually approach a unified model of them.

A Broad Approach Is Needed

Carrying out the tasks of the vital policy must begin with restructuring the stereotype of vital thinking and behavior of the majority of the population. This pertains also to many of those who should contribute to this restructuring, that is, managers of all spheres and ranks, physicians, teachers, public commentators, workers and activists in the area of physical culture and sports, and so forth. The fact is that the disparity between the significance of health and people's attitude toward it has become paradoxical. But when you try to explain the cause of this phenomenon it turns out that the psychology of health has not only not been developed, but essentially has not even been set as a task for scientific research; it is not worthy of the attention of general psychology. There is no doubt that the lack of such a branch of knowledge has a negative effect on the results of the propaganda of a healthy way of life.

Mass physical culture is usually understood to mean collective activities and measures, and basic attention is devoted to these. Thus they adopted the "criterion of systematic work"--12 classes per year which is usually sufficient to include the physical culture participant in state statistics.³ It would seem that even 50 physical culture classes a year (which corresponds to the official situation) could not be considered a criterion for systematic work. The inclusion of tourists and all students among those who are regularly engaging in physical culture and sports is also irregular.⁴ As a result, there are reports about more than 90 million people engaged in physical culture (*Ibid.*) and just from 1978 through 1979 their number increased by 22 million. All this creates a picture of the state of affairs on the "physical culture front" which looks considerably better than the situation actually is.

The data from the Pervouralsk Khrompik Association are instructive in this respect. There, taking advantage of traditional physical culture statistics, they figured out that two-thirds of the workers are physical culture participants and GTO prize winners. But the verification revealed that the motor activity of these "physical culture participants" amounts to only 7.2 percent of the recommended model (*TEORIYA I PRAKTIKA FIZICHESKOY KULTURY*, No 10, 1983, p 37). In order to better understand the reliability of such statistical reporting let us note that even in such a sporting country as Finland, only 9 percent of the men and 2 percent of the women train regularly (the same publication for 1982, No 11, p 55).

Unfortunately, even in the "Interbranch Program for the Development of Physical Culture and Sports During the Period Up to 1990," which was coordinated by the USSR Sports Committee with the AUCCTU, the Komsomol Central Committee, the Ministry of Health and other ministries, the system of indicators "even now is still incomplete, which makes the process of management considerably more difficult" (*TiPK*, No 9, 1983, p 7).

The degree of the introduction of physical culture and sports into the life of the individual is characterized by the number and duration of sessions during a week. With respect to all the population this can be explained only within the framework of a unionwide census or through representative sociological investigations. And in order to compare the data that are obtained with the statistics of illness, the death rate and injuries, it is necessary to have data for various age groups with gradations of the age in 5-year periods. We think that this should be the concern of the Central Statistical Administration and the Committee for Physical Culture and Sports under the USSR Council of Ministers and the AUCCIU.

The fact that "running should become a customary matter for many millions of people" was energetically expressed on the pages of the newspaper PRAVDA by the minister of public health, S. P. Burenkov.⁵ In the United States, the President's Council on Physical Fitness and Sports characterized running as "the main means of improving the health of the nation, which produces the greatest physiological effect per unit of time with minimum expenditures." In the first all-union "Day of Running" (1982) 47 million people participated. But where are these millions of runners on the rest of the days? In the opinion of the chairman of the All-Union Council of Running Clubs, Yu. G. Travin, many of these clubs exist only on paper....⁶

In the United States, according to the Gallup Poll, the number of people engaged in running is approaching 35 million. And even if this figure is high and does not actually correspond to the number of people who are training regularly, still the widespread running for health (jogging) in the United States has undoubtedly made a contribution to reducing the indicator of fatalities from ischemic heart disease there since the end of the 1960's, and since 1972--the reduction of the indicator of the death rate in all age and race groups of the population of both sexes.⁷ In the "Bulletin of the All-Union Cardiological Scientific Center of the USSR Academy of Medical Sciences (No 1, 1982, pp 107-109) it is noted that a considerable reduction of the overall death rate and also the death rate from cardiovascular diseases and insults (by approximately 30 percent) in the United States during the past 5 years has been related to the energetically implemented programs there for strengthening the health.

We think that it would be expedient to conduct mass runs, cross-country skiing trips, swimming events and so forth, forming the group of participants only from individual applications; and the collectives that have not been affected by the propaganda (in conjunction with the mass media) and the organization of this work would be released from the responsibility of reporting on the number of participants. Overcoming misleading appearances and sensational advertising in the mass physical culture movement is a necessary condition for its full development.

Daily Individual Sessions

Being realists, we admit that it is practically impossible to include the majority of those to whom it would be useful in mass sports and collective physical culture activities. Moreover it is well-known that for a proper return from physical culture it is necessary to engage in it every day, taking

individual peculiarities into account. Therefore, our physical culture movement will become truly nationwide in nature only when many more people than now begin to engage daily in the proper volume of physical culture individually. The more so since the modern health physical culture is a complex of physical and psychological methods and devices, the majority of which are by nature individual. These include morning exercises and mini-exercises throughout the day, walking, increasing endurance, swimming in open bodies of water, bicycling and skiing, running for health which has become more and more widely recognized, self-massage, autogenic training and also "invisible" isometric gymnastics, gymnastics for the eyes, and evening gymnastics. Everyone can select his own complex, varying it throughout the week, month and year. Certain kinds of physical culture are convenient for family activities (walking, swimming, running and so forth). For this entire list no instructors or sports facilities are required; all that is needed is the advice of a consultant and portable instruments for self-monitoring.

Collective physical culture activities have their own merits, and the demands in this area should be satisfied as fully as possible, while more energetically disseminating the experience of groups whose activities are most successful. It is important to increase the prestige of the work of the methodologist and trainer and also those who conduct this work especially well, with involvement and good results, and it is necessary to provide encouragement not only a local level, but right up to a unionwide level. At the same time even with collective sports activities it is important to individualize the load. A lack of attention to this aspect of the matter can sometimes lead to negative consequences.

Today social scientists advise comprehensive study of society and man, but in their works, with rare exceptions, the value of health, vital behavior and physical culture are either ignored or they are not given the proper attention. Therefore up to this point there are no generally accepted methods for evaluating the influence of physical culture and other aspects of vital behavior on the economic and social development of the society.

The complex of measures for strengthening the health of the Soviet person should be a "self-expanding" system of mass activities. And this is possible only with close and large-scale cooperation between labor collectives and scientific subdivisions that are studying problems of physical culture, and medico-biological and socio-hygienic problems. This is one of the paths for reorienting medicine away from the concept of "disease" in the direction of the concept of "health."

FOOTNOTES

1. Vishnevskiy, A. G., "Vosprievodstvo naseleniya i obshchestvo. Istorya, sovremenost, vzglyad v budushcheye" [Reproduction of the Population and Society. History, Modernity and a Glance Into the Future], Moscow, 1982, p 138.
2. On "health passports"--active variables in the system of measures for strengthening the health--see the article by I. I. Brekhman in the journal NAUKA I ZHIZN, No 11, 1983.

3. "Fizicheskaya kultura i sovetskiy obraz zhizni" [Physical Culture and the Soviet Way of Life], Moscow, 1983, pp 142, 183.
4. "SSSR v tsifrah v 1983 godu" [The USSR in Figures in 1983], Moscow, 1984, p 205.
5. PRAVDA, 12 September 1983.
6. See LEVKAYA ATLETIKA, No 1, 1985, p 12.
7. "The Sixth Survey of the Condition of Public Health in the World. 1973-1977," Part II, Geneva, 1981, p 176.

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BOOK ON TECHNICAL POLICY REVEALED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 215-218]

[Review by V. L. Kvint, candidate of economic sciences, Institute of Economics of the USSR Academy of Sciences (Moscow) of the book by Smilga, E. P., "Ekonomicheskiye problemy tekhnicheskoy politiki predpriyatiya" [Economic Problems of the Technical Policy of the Enterprise], Vilnius, "Mintis", 1984, 250 pp.]

[Text] The monograph under discussion was published by the republic publishing house for small editions. But the approach to the control of technical development which is elaborated in it is, in our opinion, applicable at the majority of large and medium-sized enterprises of the country. Four large problems are considered.

The establishment of the technical policy of the enterprise (TPP). E. P. Smilga consistently, using a large volume of generalized information, reveals the essence of the TPP, its structure and its typical features. By TPP the author means the system which consists of technical and economic predictions of the development of the enterprise, the long-range concept and the "tree of goals," the comprehensive target programs for the technical development of the enterprise, and the totality of long-term (future) and current plans for the technical development of the enterprise (association). The heart of the technical policy, according to the author, is composed of the concept and "tree of goals," where they single out strategic and tactical goals. The management of the enterprises, according to the acute observations of the author, when forming strategic goals should change over from orientation toward a concrete item to orientation toward that function which this item is to perform for the consumer. The center of the attention of managers of enterprises and production associations shifts from the direct production stage to the preproduction or preparatory stage. The author also focuses the attention of the readers on the possibilities of tools for system analysis with which managers and specialists of the enterprises should be armed when forming an effective and economically substantiated TPP.

Probably one should analyze the experience of combines in the GDR in strengthening the planning bases for accelerating scientific and technical progress on the basis of the application of so-called "commitment notebooks."

In these they plan the quality level of the work that is performed and the economic effect expected from series production of new products (including in freely convertible currency). These notebooks, as distinct from the schedule-orders that are used in the USSR, envision in all intermediate stages of the preparation of production a technical and economic analysis of the item that is being developed from the standpoint of its correspondence to the goals of its production. And in each intermediate stage the development of the new item can be halted if it does not provide for the planned final result. But, unfortunately, foreign experience in this work is practically not being investigated.

The point about the need for a qualitative transformation of the goals of technical progress from the higher level of management to the lower one is well argued. At the same time, E. P. Smilga essentially forgets about the regional orientation of the goals of the enterprise that are related to problems of ecology. This leads to an uncomprehensive interpretation of the system of the unified state scientific and technical policy whereby the regional cross-section is completely omitted. But the country's scientific and technical policy is most effective when it combines the scientific and technical policy of the branches and the region, giving priority to statewide interests.

The economic interpretation of the TPP. Relying on a system approach, the author continues his investigation of the economic and organizational conditions for the formation of the technical policy of the enterprise. Although the TPP pervades all the activity of the enterprise, it is sometimes difficult to be oriented to the fact that this is the most important aspect. As a rule, economic managers and practical engineers still frequently consider operational, current issues of technical progress to be the most urgent, and others, that is, long-range ones, are put off until better times. But these times have already arrived and this book gives us a sense of that. As we know, the work of enterprises is evaluated according to current production indicators, and material incentives are provided in relation to this. Therefore the managers are extremely unwilling to introduce measures of technical development which for a certain amount of time reduce the fund-forming indicators. As a result, compromises appear and current goals take precedence over strategically more important long-range goals of production.

Of principal significance regarding the two levels of the effect of technical decisions: tactical and strategic. On the first level problems of results are resolved, and on the strategic level--problems of effectiveness. It seems to us that one must agree with this, for it is too early to test the effect from the introduction of any particular measures (a semi-automated machine, a rotary line or a new technological process) until it has analyzed alternative variants of the products, their functional characteristics, there apparently lie the sources of economic and social degrees of the TPP's. In this section E. P. Smilga turns to an analysis of research of other authors in interconnection with the preparation for production and the technical policy. But this analysis is somewhat superficial. In general the weak aspects of this monograph are associated with the inadequately deep analysis of the existing publications and research by Soviet economists, although it must be admitted that in domestic literature so far not enough attention is being

devoted to the development of the most important long-term goals of technical progress at the level of enterprises and associations. And yet this is the underlying basis of all subsequent steps in planning and control of scientific and technical progress.

Although I do not think the work that is being analyzed was written as a handbook for managers and specialists, it could easily be one. Thus the classification of the stockpiles (reserves) necessary for conducting an economically effective technical policy (p 111) is an example of concrete assistance for production workers.

Improvement of the economic substantiation of the TPP. Investigated here are the possibilities of the enterprise in the area of its formation, the technical and economic model of the enterprises and the main constituents of the economic effect. Attention is drawn to the original investigation of the possibilities of enterprises, their composition, and the pattern of realized and unrealized possibilities. At the same time, the problem of improving the organizational structure of scientific and technical services and subdivisions of the enterprise is left out. A scientific substantiation of the distribution of these functions in the sphere of scientific and technical progress could expediently be considered in connection with the formation of the enterprise's technical policy.

E. P. Smilga tries to analyze as many as possible of the aspects of expedient maneuvering when forming and implementing an effective TPP. With the help of the method of comparing scenarios and developing a "tree of goals" he tries to determine the boundaries of technical, technological and organizational maneuvering both in stages of NIOKR and in stages of assimilation and series production.

The attempt to investigate the five constituent parts of the economic effect of the technical policy seems very promising. Two constituent parts seem to be the main ones: the effect of goal setting and the effect of system utilization of the capabilities of the enterprise. It is typical of the former to have a deliberate formation of the corridor of strategic maneuvering in all stages of planning, assimilation and production. The author understands the corridor of maneuver to be that interval of allowable change in any target indicator which will still make it possible to realize the highest goal "in the tree of goals" of the TPP.

Methodological problems in forming an effective TPP. Here attention is drawn to the investigation of problems of structuring the TPP which is conducted using practical material.

Of course, the book is not without certain other shortcomings in addition to those already mentioned. It would be interesting to know the author's opinion of who and which services of the enterprise would engage in the extremely complicated calculation of the effect of goal-setting. One would like for questions of the economic substantiation of the TPP to be resolved not only at the methodological level, but also at the level of methods. A number of the points brought up in the sphere of planning technical development of the enterprise are not linked to plans for financing and material and technical

support. There are repetitions which could apparently be explained by polemical fervor, but they are not necessary in a monograph. On the whole, the book under review shows that the Lithuanian SSR has begun a new, interesting area of research on economic problems of scientific and technical progress at the level of enterprises and associations.

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RESEARCH ON BAGEL BOOM REPORTED

Novosibirsk EKONOMIKA I ORGANIZATSIIA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 86 pp 219-221]

[Article by A. Rutitskaya and S. Anufriyev (Moscow): "High Effectiveness for Science!"]

[Text] Respected comrades! Our scientific research institute was created only a couple of years ago but we are already able to submit for the judgment of the public and higher agencies certain results, albeit modest ones.

A year after its formation our scientific research institute merged with the local branch of the Wheat Academy, which made it possible in reduced time periods to prepare for and conduct a unique experiment in raising bagel items directly from the seeds of Elite-82 wheat. A comprehensive interpretation of this experiment which is immense in design took us the next 3 years. As a result we managed to make an essential contribution to the methodology of research and to confirm our basic point that a negative result in science is no less important than a positive result. We are operating on this basis to this very day.

The basic problem in which the scientific research institute is engaged is increasing the coefficient of roundness (K_0) of bagel items which, as you all well understand, is an important national economic task. In order to calculate the roundness, the following fund-forming indicators were used: the diameter of the bagel; the percentage of the curve.

The diameter is a directive indicator which is calculated on the basis of pi and is established for the five-year plan with a breakdown for the various years. Overfulfillment of the plan according to pi is a most important reserve for increasing the effectiveness of production at our association. The percentage of curve (P_{Cu}) is calculated as the ratio between the mass of bagels that meet the norms of Euclidean geometry (N_n) and the entire mass of all bagels (M_b);

$$P_{Cu} = M_n/M_b \quad (1)$$

Since the percentage of curve calculated in this way is as high as possible at our association, the existing indicator no longer suits us. We contacted the

Institute of Curvilinear Problems. As a result of joint work it was recognized as expedient to change from the norm of Euclidean geometry to the norms of Lobachevskian geometry. Then formula (1) will assume the form:

$$P_{cu} = (M_n)^2 \quad (2)$$

After which we find the desired coefficient of roundness according to the formula:

$$K_0 = "Pi" \times P_{cu} \quad (3)$$

Having introduced this formula into production, we shall improve one of the most important consumer qualities of our items and obtain a great economic effect. It is now up to the authorized agencies where we have sent our suggestions.

The next important problem being resolved in our scientific research institute is the problem of optimization of the production in which the aforementioned bagels are produced. There are two variants of technology: 1) to make an opening within the bagel; 2) to make the bagel around the opening. Our scientific research institute has taken as a basis the former variant, since in this case the association does not depend on associated workers who deliver bagel holes.

Taking our "know-how" into account, our scientific research institute has developed a process for making openings in a semi-manufactured product with the help of the MZ-14 electric drill and a KV-15 jackhammer, which was carried out using the method of linear programming. We carried out such a process for the first time in world practice.

Moreover, in our scientific research institute we have perfected the process of producing bagels to which, in the last stage of the technological cycle, we have now begun to add various explosive substances--depending on the kind and sort of the items. This has made it possible to find a radical solution to the problem of quality, and particularly our interrelations with the technical control division. Now nobody is keeping our bagels from reaching the consumers.

Recently our scientific research institute has been involved in research of the aerodynamic properties of bagels and their electric conductivity. In particular, it was established that if one glues bagels to an aircraft it will not be able to take off. We have addressed the corresponding agencies with proposals to introduce into the "air code" an article which prohibits gluing bagels onto aircraft. Our suggestion is being considered. Incidentally, bagels were also glued to one tanker for local sales of kvass, which, as a result, was also unable to take off. This discovery was submitted for registration in the Committee for Affairs of Large Discoveries and Inventions.

As concerns the electric conductivity of bagel items, it turns out that it is great. It is regarded as expedient, therefore, to use bagels as individual lightning rods. Housewives will be interested to learn that one should not eat bagels and use electrical appliances at the same time.

Our scientific research institute is developing several theoretical problems. Here are some of them.

1. The consumption of bagel items among the ancient Incas as implements of torture;
2. Unidentified flying objects in the form of bagel items from our association;
3. The baton as a bagel item.

Thus our scientific research institute is doing everything possible so that the population will not experience a shortage of bagel items that are sufficiently round, sufficiently aerodynamic and conduct sufficient electricity, and we are also providing for a maximum economic effect.

Thank you for your attention!

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